

SKYWAYS



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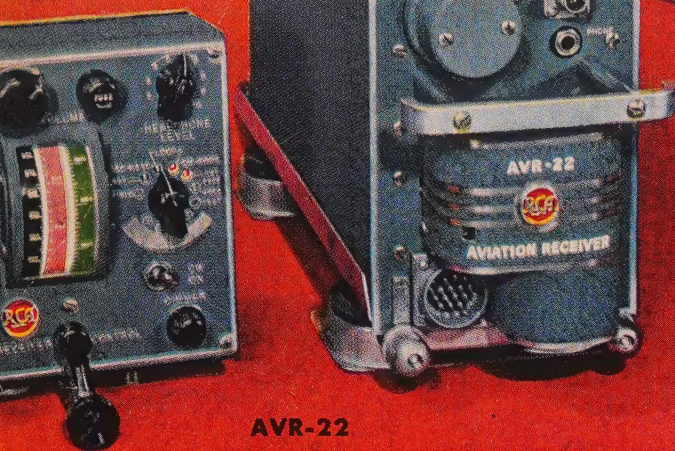
It's fun...
NIGHT FLYING
in your own personal plane
A pilot reports on the
CULVER V

JANUARY 1947

25¢

IT'S NEW!

ANOTHER COMPLETE AIRCRAFT RADIO SYSTEM by RCA...



AVR-22

AVR-22 AIRCRAFT RECEIVER

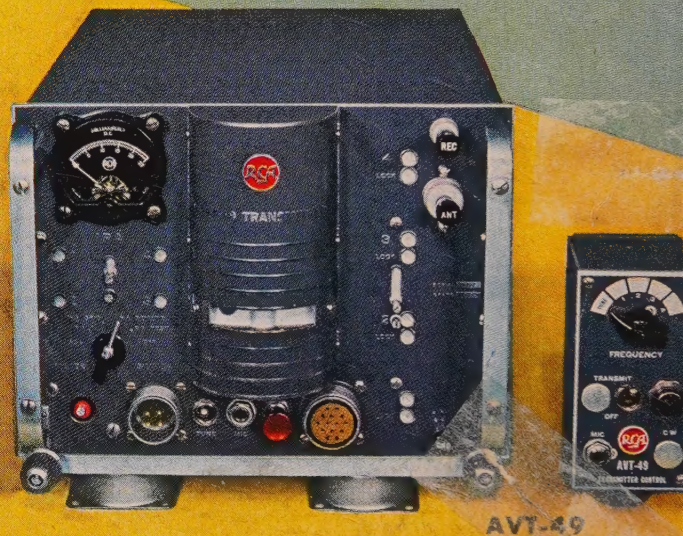
Less than half ATR size! Weighs only 21 lbs. complete. Designed to operate with Model AVA-62 loop antenna for aural direction finding.

AVT-49 AIRCRAFT TRANSMITTER

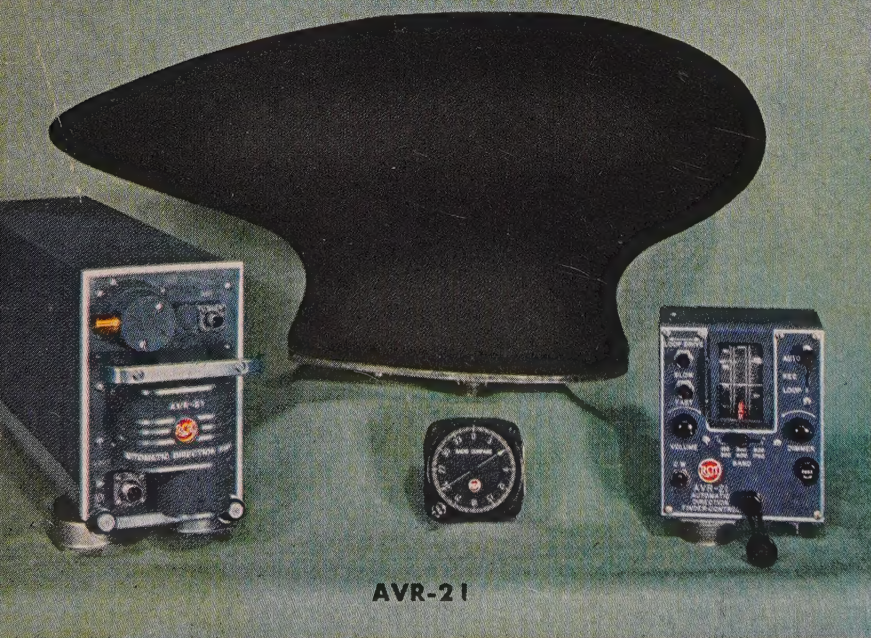
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One-half the size, two-thirds the weight of similar equipment. You can have dual ADF operation for nearly the weight and size of existing single installations.



AVT-49



AVR-21

Here it is! A complete radio communication and navigation system for use on scheduled or non-scheduled aircraft—from executive aircraft to transoceanic freighters.

RCA has designed and developed this new radio equipment to combine lightweight, smaller sizes, attractive styling, with high-power output, wide-range operation and low maintenance cost. This entire new family of RCA Aviation Equipment meets every requirement for CAA Type Certification.

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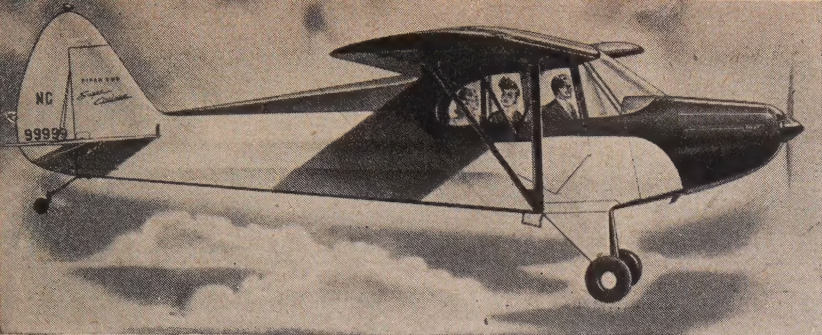
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AVIATION SECTION

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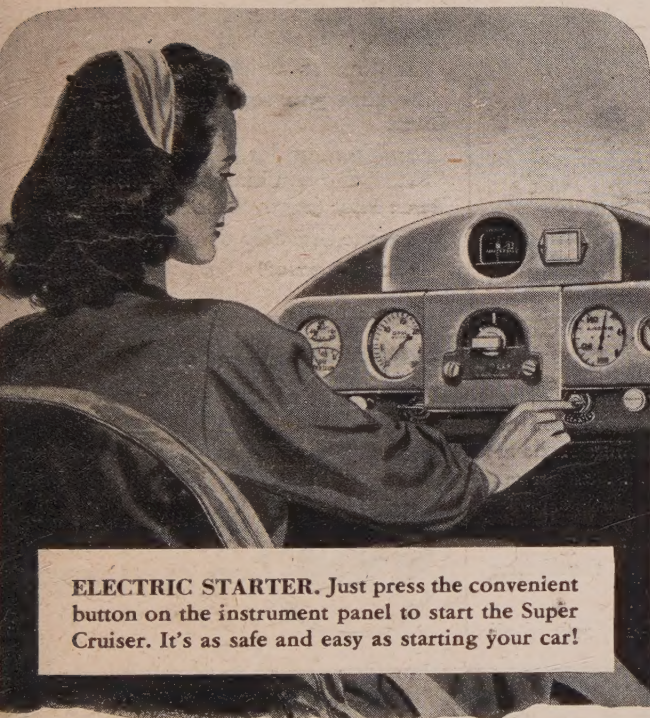


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THE 1947

PIPER CUB SUPER CRUISER
FOR 3 PEOPLE

PIPER
brings you a
TWO-WAY RADIO
and an
ELECTRIC STARTER
as standard equipment



ELECTRIC STARTER. Just press the convenient button on the instrument panel to start the Super Cruiser. It's as safe and easy as starting your car!



TWO-WAY, TWO-BAND RADIO. Combines transmitter and receiver. Both airways and regular broadcast reception. Instrument panel controls.

"It has everything!" . . . that describes the three-passenger Piper Cub Super Cruiser. Although it is moderately priced, the Super Cruiser includes a two-way, two-band radio and an electric starter as *standard equipment!* Now you can fly cross-country by radio beam, talk with airport control towers, enjoy favorite programs in flight. The electric starter eliminates hand-cranking the propeller. You simply press a button on the instrument panel. It's safer . . . more convenient!

A full hundred-horsepower engine, quieted by a muffler, gives the Super Cruiser a top speed of 115 miles per hour. And you can travel more than 600 miles at a hop, thanks to the 38-gallon gas capacity! All this in a *three*-passenger plane—for the price of many two-passenger ships.

Have your Piper Cub Dealer give you a free flight demonstration now. See him, too, for the full-color Piper Cub literature and the popular books . . . *How to Fly a Piper Cub* and *What Your Town Needs for the Coming Air Age*. Remember—only Piper makes the Cub, that good, safe plane. Piper Aircraft Corporation, Lock Haven, Pennsylvania, U.S.A. . . . In Canada: Cub Aircraft Ltd., Hamilton, Ontario.

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LOOK TO THE LEADER FOR GOOD SAFE PLANES
YOU CAN AFFORD TO BUY AND FLY

PIPER

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JANUARY 1947

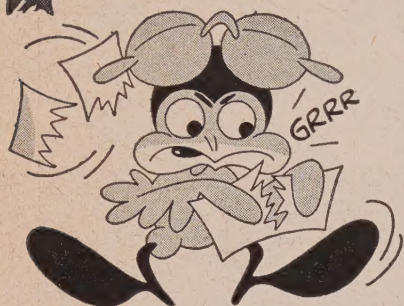
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The Birdmen's Perch

By *Major Al Williams*, ALIAS, "TATTERED WING TIPS,"
Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh 30, Pa.



There oughtta be more Perch Pilots!

It's not our fault.

Over and over we've offered you commissions as Perch Pilots (bottom rung) for your Little Known Facts About Well Known Planes. And over and over we've said that your "Fact" must be accompanied by proof.

We mean PROOF!

Take this item:

"A PBY-5-A was once used as a primary trainer for a chap who was 7' 6½" tall because it was the only easy-to-fly plane big enough to accommodate him!"

Swell item . . . but no proof. So we couldn't use it, and a lad out in Hayward, Cal., missed out on a Perch Pilot's commission. Here's another:

"P-47's operated from U.S. Navy carriers during the Pacific war!"

Or:

"B-29's show a speed increase of 125-150 m.p.h. when gun turrets are removed!"

Terrific! . . . if true. But how can we tell without proof? We can't. So there are two more commissions that should have gone out but didn't.

Now will you send proof?

BEAUTY—AND THE BEST

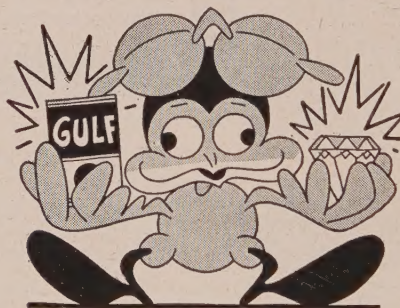
The function of a gem diamond is to be beautiful.

But before it can perform this function, the rough diamond must be cut into facets. This operation disposes of some of the diamond—but tremendously increases its ability to reflect light . . . to be beautiful.

Diamond cutters have devised a way to get *more* beauty out of a stone, now.

They take an already cut stone and cut *extra* facets in the girdle (the dull side-edge) of the stone. These extra cuts dispose of a little more of the diamond's weight, but so improve its light-reflecting ability that it becomes even more radiant . . . even more beautiful!

The function of an oil is to lubricate.



But before it can perform this function, the crude must be refined. This operation disposes of some of the crude, but tremendously increases the ability of the remaining oil to lubricate . . . to prevent metal-to-metal contact.

Gulf engineers devised a way to get *more* lubrication out of an oil, the Alchlor Process.

In effect, it takes an already refined oil

and gives it an *extra* refining! This extra refining disposes of more of the oil's weight (carbon formers and sludge makers, mostly) but so improves its lubricating ability that you get extra protection for your engine, when you use Gulfpride Oil.

Remember that name: Gulfpride. It's the only lubricant you can get that's Alchlor-Processed!

LITTLE KNOWN FACTS DEPT.

We love you, J. R. Marlette—pardon, Perch Pilot J. R. Marlette.

Your handsome, engraved-type commission (da Vinci couldn't have done a classier job!) is on the way to you, and we welcome you to the fold with your "Fact":

"Operational range of a fully loaded B-32 can be diminished as much as 500 miles by merely leaving the cowl flaps at full-open position!"

And why do we love you?

Because you sent proof with your item!

And remember, 4 more accepted "Facts" and you rate a promotion from Perch Pilot (br) to Senior Perch Pilot.

Anyone else? Step right up.

But with proof!

Gulf Oil Corporation and Gulf Refining Company...makers of



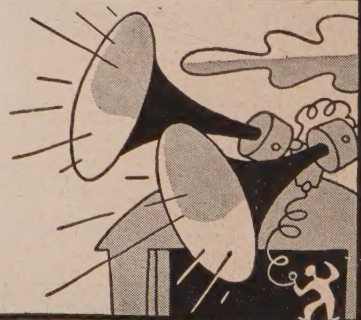
PILOTS, ATTENTION!

The Sixth Gulf Air Tour to Florida is coming up January 2 to January 26. All you need is a plane, the desire, a map, and an application which you can get from Gulf airport dealers.

AND IF YOU'VE GOT 125 HP (or less) THE GAS AND OIL ARE ON GULF! FREE!

This is our contribution to the advancement of private aviation. See you in Florida.

AL WILLIAMS





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THE company truck and the company car are now joined by the Beechcraft Bonanza. For it hurdles long distances at 175 mph, speeding executives and personnel around the country with four times the efficiency of surface transportation—and at a cost as low as one cent per passenger mile!

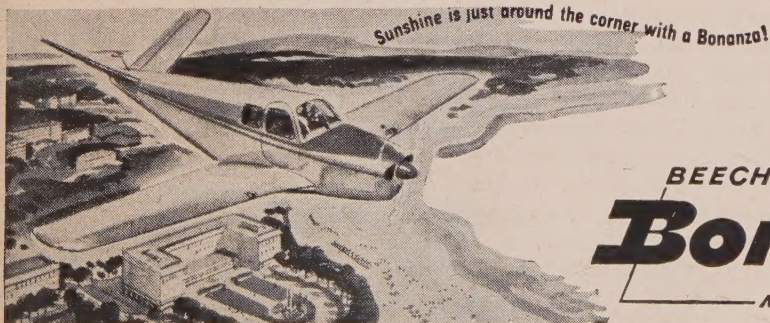
No ordinary airplane is capable of the utility required of a business vehicle. But the Bonanza is an *extraordinary*

airplane. It was *built* for business use, business utility, business economy. It has a speed and a payload with its economical 165 hp which have never before been accomplished short of 330 hp!

Its cabin for four people provides limousine luxury and comfort—thoroughly soundproofed, as quiet as an open-window car traveling at 55 mph. It is fully equipped—heater, two-way radio, landing lights and instruments for

accurate and safe navigation; retractable tricycle landing gear, landing flaps and controllable prop for easy handling and added economy of operation.

The man-hours, money and travel fatigue which the Bonanza saves as a unit of your company transportation "system" repay many times its modest cost. The price complete is \$7,345 F.A.F. Wichita. Production for early 1947 is already sold. Orders for delivery will be filled in the sequence received. There is a nearby Beechcraft distributor with complete facts and figures ready to consult with you. Beech Aircraft Corporation, Wichita, Kansas.



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BONANZA
MODEL 35

Next to Atomic Power it's
GAS TURBINES
 &
JET PROPULSION
for Aircraft

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Flight and Aircraft Production (England)

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No Help to Airport Owners

AN EDITORIAL

WHERE does public interest end and private interest begin on airport financing? The Federal Airport program is getting majestically under way and all over the country, States and municipalities are rolling up their sleeves and whetting their pencils to figure just how much of Uncle Sam's money they can attract to their own precincts. Off on the sidelines sit the private operators, wistfully wondering whether any of the golden flood will wash their starveling shores, and going home in the evening to have nightmares about competition from new municipal and county fields that will be built uncomfortably close to their dirt runways. The question was posed recently to a member of the *SKYWAYS* staff by the owner of such a field, located close to a Class IV county airport. He looked from his own dusty, well-worn strips to the mile-long concrete landing areas of his opulent neighbor and said: "My airport and thousands like it all over the country are under-financed. There just isn't enough business at this point to pay for the upkeep on runways, improvements and construction. If you could somehow persuade the government to help those of us who are trying to establish private airports, it would be a wonderful thing."

It is an old complaint. Coupled with the rising storm in Europe in the 30's, it bred the Civilian Pilot Training Program, which saved the necks of a good many hard working airmen who had striven to teach America how to fly. It also helped save the U. S. when the blue chips were down in the Biggest Game of all time. It has carried over now into the legislation under the GI Bill of Rights which permits aviation training to any veteran who can qualify. The emphasis in this latter case is on the veteran himself, as it should be, but the national enthusiasm for flight and for protecting the means of flight is partially responsible.

Out of that GI Bill, once again, a lot of small airports are being saved. Yet our friend who posed the question still feels that competition from the big, publicly financed field will be too much for him. So *SKYWAYS* did some investigating in Washington. Under the Federal Airport Bill, there are no funds available for any but public projects. What then are the States doing? Is there any way under their laws for the private citizen who sinks his money and his time into his own field to get financial help? The first answer from the experts was an unqualified "No," with a brace of cogent reasons. "Unconstitutional use of public funds," one called it.

"If you get public assistance, you get public control, too," said another. "Most private owners don't expect public financing—

why should the private operator in aviation?"

"What about the situation of earlier days when the railroads were being built?" we wanted to know. "Is there any comparison between their operation and that of our airport friend? The Federal Government at that time gave tremendous land grants and the States allowed certain cities to permit tax exemptions which induced railroads to include them on their routes."

"Yes," said the experts, "but those land grants have been retired as rapidly as possible and the tax exemptions were revoked. They were only given because the railroads were in a real sense common carriers—which would not cover the case of a private airport operator. If there is no municipal airport in a town, the man who owns a field might be able to get the city to buy it and then get the operating concession. But in so doing, he loses his freedom of action. He becomes a lessor, not an owner, subject to all the devious ways of public control. Most of them don't want that."

The consensus of experts was that the private operator could not expect public help. The one real exception seems to be in special provisions made in connection with GI aviation training. In certain cases, flight schools approved for such training might possibly be considered to be operating in the public interest and so could gain assistance in an effort to improve their fields to meet the requirements.

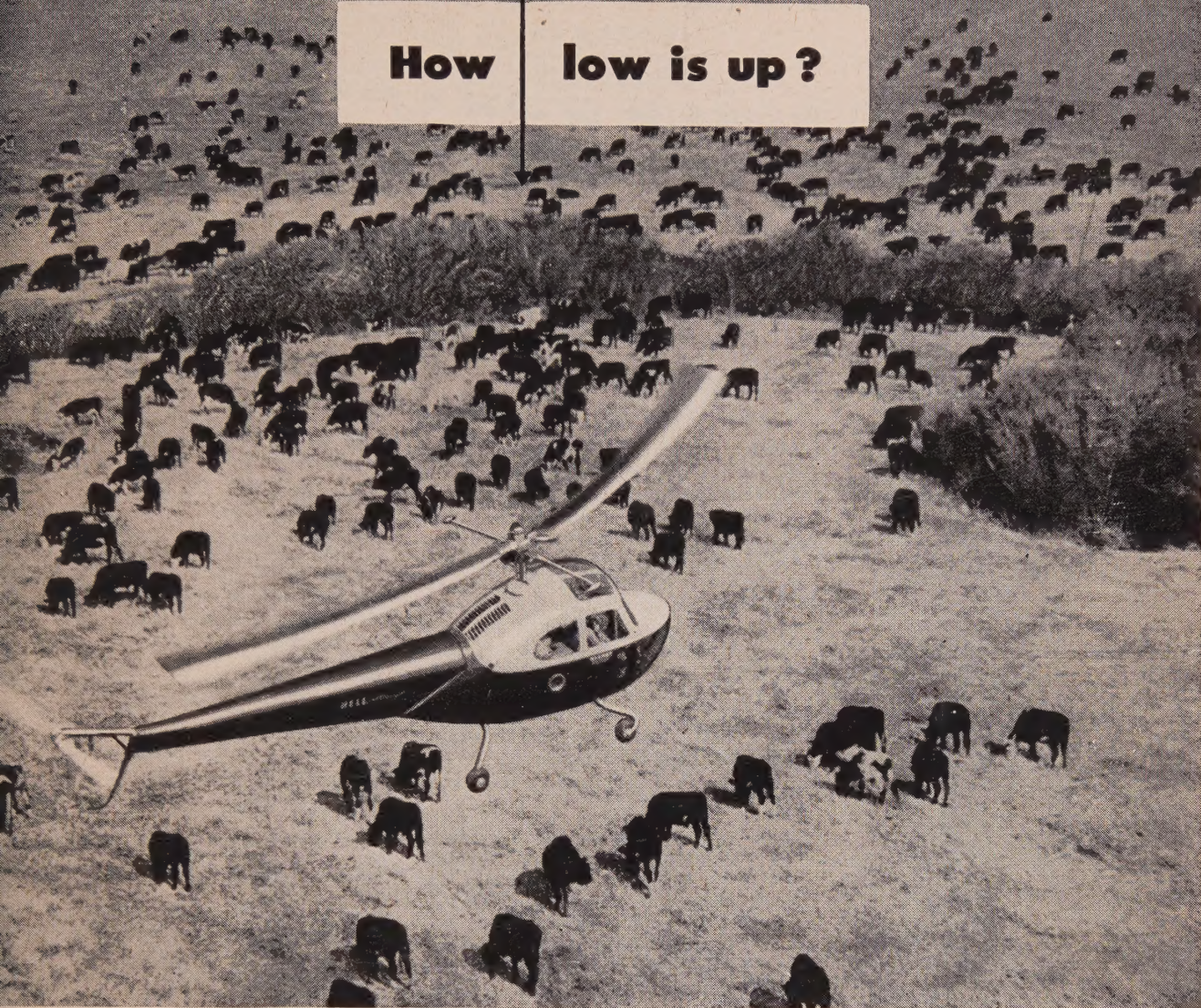
Refined down to its essentials, the discussion ended on the simple issue of the right of private enterprise, if it is to remain private, to stand or fall by its own ingenuity and hard work. The risks attendant on such an enterprise are the same as those of a man who builds a movie theater or a grocery store. He may choose his location well, at the time he goes into business, and later see a chain store or chain theater open its doors across the street. If his handling of the public has been superior, his established good will may carry him through; providing he is also an intelligent buyer and manager. There is always room for the man with better ideas and more attractive presentation of those ideas than his competitor. The discriminating public has a way of preferring the small, exclusive shop to the glaring obviousness of the "Five and Dime." And discriminating bankers will be ready to recognize that type of community service when they see it.

Perhaps that is what the "little fellow" in aviation needs: not a foot chained to the State or Federal trough, but more of the imaginative resourcefulness which made 13 undernourished colonies the greatest and wealthiest nation on earth.

J. FRED HENRY

SKYWAYS

How low is up?



To an ant—"up" is a grasshopper's knee. To a giraffe—a succulent tree-top shoot. If you know your Bell Helicopter, too, anywhere above the ground is "up," as this ship walks gently on air.

It flies low to spray or dust an orchard. Close to a power-line, it stands in midair while a supervisor inspects. It dusts crops below the level of the barn roof . . . it pauses to drop off a package . . . it cruises slowly over a fire while a newsman takes the picture.

And the quick way to count a herd of cattle is by helicopter.

How does the Bell Helicopter fly low with safety? It can fly low safely because it can rise *straight up* to avoid an obstruction, or stop still, or back up. It can inch along at 1 mile an hour. And from lowest altitudes the helicopter can go *straight down* slowly to a spot hardly larger than the span of its rotors.

These are some of the practical reasons The Modern Magic Carpet* does

so many jobs with down-to-earth skill. Add a steady ride, speeds to 100 mph, and a cruising range of over 200 miles. The sum of these is new profitable flight for government services, business, and agriculture.

Bell is now producing helicopters and schooling pilots to fly them. To find out how the Bell Helicopter can work efficiently for you, write Helicopter Division, Bell Aircraft Corporation, P.O. Box 1, Buffalo 5, New York.

BELL Aircraft
CORPORATION

Pioneers in jet-propulsion, radio-controlled flight and supersonic aircraft for U. S. Army and Navy. Designers and builders of the world's first commercially licensed helicopter.

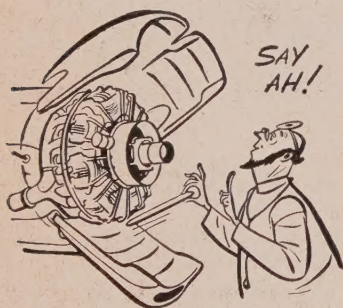
HANGAR FLYING



The Mechanical Mouth

It used to be like pulling teeth to get under an engine cowl. After a quarter-hour of yanking on rows of fasteners, you took down a truckload of Dural shingles. If you didn't lose or mash any under foot while you worked on the engine, you were lucky.

Now it's as simple as lifting the hood on the family bus. Lockheed engineers have worked out a new mechanical mouth for *Constellation* engines that opens up in two minutes flat. Unclasp and lift two small side panels, pull away the one-piece upper and lower hoods, and the engine's as bare as the tonsils of a six-year old saying "Ah!"

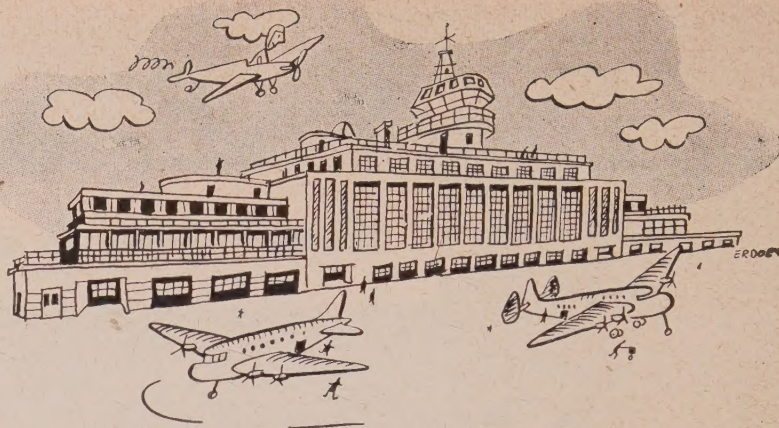


The giant metal jaws stay open obligingly, and completely out of the way. Prying engine medics get plenty of elbow room and save precious minutes on routine inspections. And the mechanical mouth shuts just as fast. Out at Lockheed, the story goes, they took turns saying "Jack Robinson" in timing it.

Everybody that sees the mechanical mouth says it's just common sense. And it's this kind of common sense that gets all the green lights at Lockheed and keeps refinements in step with aviation progress.

L to L for L

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WASHINGTON NEWS

Capital Aviation

Aviation, for once, has taken first place in the national capital. The Engineering and Research Co.'s plant at Riverdale, Md., is actually the largest industrial outfit here. Now turning out 20 *Ercoupes* a day on its assembly line, the Company employs 1,900 men and uses 100,000 square feet of factory floor space for production. Plant-designed machine tools are manufactured along with the trim aircraft, and work is now under way to turn out the new \$12,000, twin-engine version of the non-spin, non-stall plane by the middle of this year. Chairman of the Board, Henry Berliner, expects to step up daily production by that time.

Headquarters

Andrews Field, Camp Springs, Maryland, is now HQ for the Strategic Air Command, with nearly 1,000 total personnel. As a long-range striking arm of the AAF, the Strategic comprises very heavy bombardment, long-range reconnaissance and fighter groups under General George C. Kenney. In it have been incorporated the Fifteenth Air Force, whose HQ is at Colorado Springs, Colo., and the re-activated Eighth Air Force, headquartered at Fort Worth, Tex.

Swords Into Ploughshares

The White House had a caller the other day. A Farmer Arnold has come to town from Sonoma, Cal. It isn't too easy to see the President of the U.S.—for an ordinary citizen—but this farmer made it on the first try. He was there to give some firsthand information on the troubles of farm folk and to admit that there could be snafus in the running of a rural hacienda, even one well equipped with large and shady oaks, where no noisy airplanes buzzed overhead. The "Old Man" told the President there was a lot to be said for the new way of life but "something just had to be done" about making income and outgo meet for the farm family. The President, pretty much of a dirt farmer himself, cocked a sympathetic ear. Then the ex-General of the Armies—oops, pardon us, Farmer "Hap"—came out to where the press was waiting and admitted with little persuading that the country did

have some advantages. He is now a fish and game warden, and that, he said with deep satisfaction, "carries a badge of authority."

Airmail Up

The first 15 days of U.S. Post Office Department operation with the five-cent airmail postage showed almost half a million pound increase over the same 15 days a month before under the old eight-cent rate. Average increase by individual post offices was 26.48 per cent. Total pounds dispatched Sept. 1 to 15th, 1946, was 1,911,367 at eight cents; at five cents between Oct. 1 and 15th, 1946, it zoomed to 2,290,971. Both the Government and the air lines see in the lower rate the answer to a steady, sound increase of commercial air carrier development, with benefits to all types of business which can use speed in their transactions.

USSR's Atomgrad

It gives furiously to think when it is realized that the Soviet research appropriation for the next year has been increased 24 per cent "for the further growth of the economic and military might of the Soviet Union." Our own total for the next fiscal year—which includes agriculture and atomic fission—is \$800,000,000. Aviation research was cut 16 per cent under the appropriation figure for 1946, with only \$312,000,000 being doled out to the Army, the Navy, NAC and CAA. USSR will spend 5,000,000,000 rubles (which is approximately \$950,000,000). Add this to the recent news report of the Soviet's new research center, named Atomgrad, and do your own calculations.

Airport Program

Airport planners are again urged by the Civil Aeronautics Administration to begin placing their applications with the Government for Federal aid on the local level. The CAA district airport engineers are the key men in the Federal Airport Program according to Administrator T. P. Wright.

World Charts

Coast and Geodetic Survey, Washington, D. C., has available for sale, at 40 cents per copy, 43 charts in its World Planning series. (Continued on page 85)

SKYWAYS

Incorporating Air News

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by Ren Wicks

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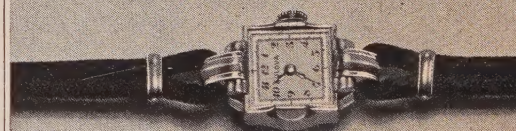
It's 12:15 P.M.
Bulova
Watch Time



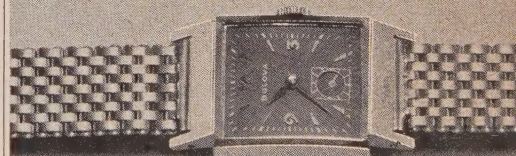
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America Runs On Bulova Time! Yes, Day-after-day, year-after-year, whatever people do, wherever people live—all across the nation—they schedule their lives by Bulova Watch Time! For, more Americans tell time by Bulova than by any other fine watch in the world!

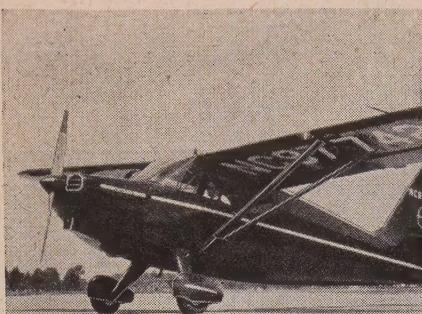


VIOLET . . . 17 jewels . . . \$42.50



DOUGLAS . . . 21 jewels . . . \$67.50

America runs on
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Right on the nose of the Stinson Voyager 150

READY to wing into the blue is Stinson's new sleek Voyager 150. Every inch of her is soundly engineered. And she's out in front with a prop that's renowned for outstanding performance—a Sensenich. For nearly a quarter of a century Sensenich has been building quality propellers. That is why most personal plane manufacturers specify Sensenich.

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Standard of Performance



Trade Mark

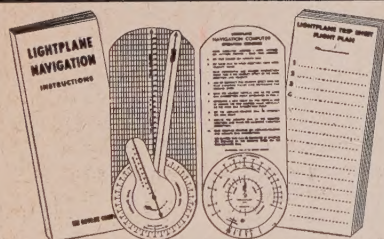
SENSENICH BROTHERS

LANCASTER, PA.

GLENDAL, CALIF.

Here It Is...

LIGHTPLANE NAVIGATION



TAILORED FOR LIGHTPLANE PERFORMANCE

NEW SIMPLIFIED METHOD

Helps you plan every Cross-Country flight with ease, speed and accuracy, in the air or on the ground.

Designed to simplify and solve graphically:

- Variation
- Wind Vectors
- True airspeed from indicated at altitudes
- Ground Speed
- Elapsed Time and Distance
- Establish Wind Speed and Direction in Flight, if not known

Newly developed computer, simply and easily read, presents graphically and naturally, answers to Lightplane Navigation problems. Just set the dials and place the answer on a trip sheet.

Handy trip sheets are furnished to aid in "Setting Up" flight plan and furnish a record of your trip.

Navigation Kit consists of Durable Laminated Plastic Computer, Instructions and Simplified Navigation Booklet, Supply of Handy Trip Sheets, all contained in convenient packet.

Complete compact kit \$12.00 postpaid.

THE ROTOJET COMPANY

DEPT. 6, BOX 757

LOS ANGELES 25, CALIFORNIA



AIR YOUR VIEWS

Lost and Found Dept.

Dear Sir:

I have misplaced my private pilot's license and medical certificate. Can you tell me where I should write in order to have another copy sent to me? I want to fly as soon as possible.

STEPHEN FERRARO

Paterson, New Jersey

Duplicate copies of lost certificates may be obtained from the Certificate Section, CAA, Washington, for \$1.00 per copy.—Ed.

G. I. Flight Training

Dear Editor:

Alice Hager of your Washington office has asked us to forward to you the answers to questions raised by readers about flight training under the G. I. Bill. (SKYWAYS Editorial, Sept. issue).

It looks as though these readers have tried to enroll in flight courses at the same time they are taking other training under the G. I. Bill. This would be permissible if flight training were actually a necessary part of their other course, but regulations do not permit two or more unrelated courses at the same time.

I think the editorial in your September issue made this point clear by emphasizing the desirability of retaining eligibility under the bill. If these veterans retain enough of their eligibility they should have no trouble obtaining supplementary certificates to get their flight training at a later date when they are not enrolled in any other courses.

LOUIS P. ADE,
Veterans Administration

Washington, D. C.

The confusion here was undoubtedly occasioned by the fact that, according to the original interpretation of the law, a veteran could not change his course of study under the G.I. Bill, regardless of the amount of his eligibility. Under the new interpretation, when one course of study has been successfully completed, another may be started, limited, of course, by the veteran's amount of eligibility.—Ed.

How Do You React?

Gentlemen:

Peggy Gibbons' article "Is There Room for the pilot's wife?" (SKYWAYS, November '46) is one of the first I've seen to give an accurate description of the effect of flying on many passengers—I, e., jelly knees, troubled stomach, petrified spine. It was also a near-first in describing the decidedly unfamiliar appearance that places on the ground have from the air. Even the supposedly well known fact that a plane seems to creep in the air, except at low altitudes, hasn't

gotten around to people as much as it should.

Let's have more accurate descriptions and fewer romanticized versions of flying. That will make for fewer people dropping flying because the "pleasure was less than anticipated."

NORMA ORGAN

Carlisle, Indiana

A Sane Appraisal

Gentlemen:

Unfortunately, Reader Bonazzoli has a point. And the myriad of writers who will answer have points. Let's look at the score.

Army pilots—in fact, all pilots—are divided into two classes: good and bad. The difference between these classes is seldom technique, judgment, or any other commonly accepted characteristic. The real determining factor is, and will always be, attitude. The 40-hour private who knows his limitations and doesn't exceed them is a better pilot than the 2,000-hour jet king who knows everything about flying except one thing and lets that one thing trip him up.

I have been back in the States only two months, but I have learned to conceal the fact that I ever flew fighters. My ex-comrades have incensed the civilian pilots so that they volubly doubt the ability of any service pilot to get up and down stairs safely. One ex-utility pilot (pretty low) told me: "I've flown hotter stuff than these guys have ever seen." (AT-6's, probably BT-13's, and possibly one terrified trip in a P-40.) He buzzes a local lake daily in a Cub to show how hot he is.

The hot boys are doing one thing that is bad for us all. They are scaring away potential flyers in droves with their antics. This applies to all the warm-stones, civilian and military.

ROBERT WOODIN

Earlville, Illinois

All Aboard for Mexico

Gentlemen:

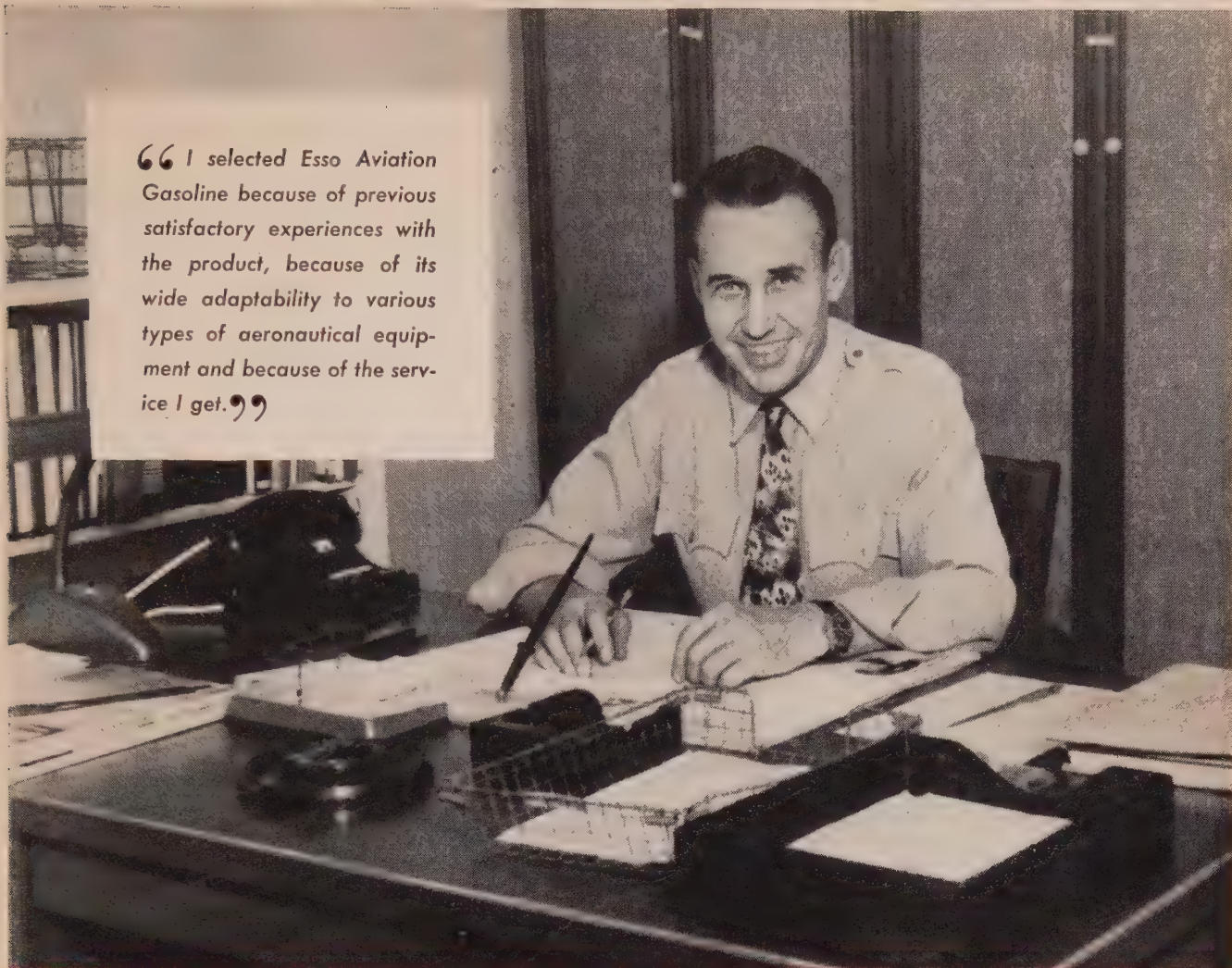
I am planning a lightplane trip from Antigo to California in November. I would also like to go to Mexico City. Where can I get an air map of Mexico? Do we need passports or not? Any other information would be appreciated.

JAMES SPYCHALLA

Antigo, Wisconsin

Passports are still necessary to cross the border. They may be obtained either through the State Department or through the nearest Clerk of a State or Federal Court. You can get air maps of Mexico, usually, at the same place you get air maps of the U.S. You should fly by way of a port of entry, since you can be cleared quickly there. Both El Paso and Brownsville are good places to go through—and if you don't get one before, you can probably get your air map there. You do not need CAA clearance,—but you'd better brush up on your Spanish!—Ed.

“ I selected Esso Aviation Gasoline because of previous satisfactory experiences with the product, because of its wide adaptability to various types of aeronautical equipment and because of the service I get.”



Mr. Blake's three big reasons!

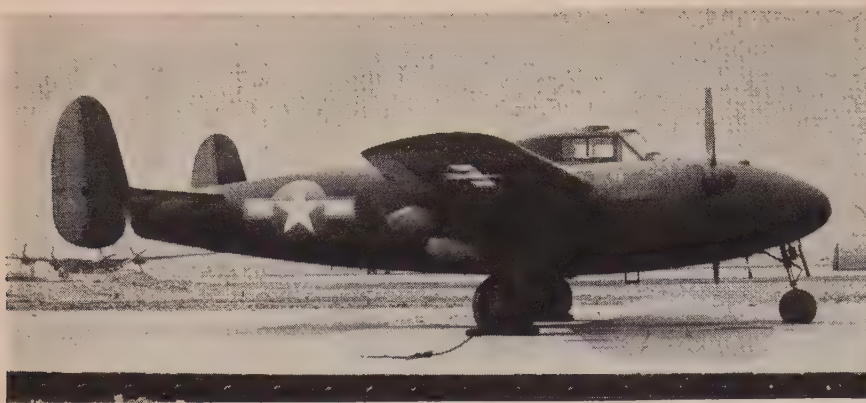
A veteran aviation enthusiast, Mr. Walter M. Blake started flying in 1927. His experience is varied and wide... from a District Sales Manager for the Stinson Aircraft Corporation to a Captain for PAA and the Royal AFTC. Holding six different aviation licenses and certificates, Mr. Blake now manages McKellar Airport, Jackson, Tenn.

More and more experienced men in aviation are swinging over to Esso Aviation Products. They know that Esso Aviation Dealers are in step with air progress with ever-better Esso Aviation Products, backed by intensive Esso Aviation Research... and over 40 years of continuous aviation experience, dating from the Wright Brothers' first flight at Kitty Hawk!



YOU CAN DEPEND ON





REMOTE-CONTROLLED Fairchild XBQ-3, is ground-launched "drone" version of AT-21

MILITARY AVIATION

Ranging Robots

AAF and Navy pilots who have been in close touch with remote control developments are agreed that radio-controlled aircraft can now be used for any purpose piloted planes can fulfill. This means that until the Army's long-range rocket program reaches the production stage, probably several years off, a potential reserve of guided missiles is on hand in this country and at outlying bases of several thousands of B-17's and B-29's which can be modified as "drones." These long-range four-engine bombers, stripped of all armament, flying without crews and with fuel for a one-way trip, have ranges up to 3,000 miles, carrying tremendous loads of TNT and newer, more potent explosives.

Each robot is fitted with radio, radar and television equipment and an automatic pilot. A mother plane guides each bomber-missile by means of elaborate radio equipment, and a television receiver. The television picture from the robot is picked up by the bombardier in the mother plane, and when the screen shows that it is turning away from a direct line in the target, he can bring it back by manipulating the miniature control stick on the box in front of him. This transmits radio signals to a receiver in the robot, causing the position of its aerodynamic control surfaces to be altered so as to bring its course back on the target. As the guided missile nears its target the mother plane turns back, directing it in the final approach by remote control. Importance of this "on hand" type of long-range robots lies in the fact that they are workable now and have a range 10 times greater than the German V-2 rocket. Rockets with much greater range are under development by all the great powers, but as far as is known none have been perfected as yet.

Airborne Army

The War Department is well along in planning a future army of the air. This is based on recommendations to General Eisenhower of 40 top-ranking ground generals. Detailed studies are being carried out at the Airborne School, Ft. Benning. The main idea is to make the entire army transportable by

air, not that all soldiers would be airborne troops like the paratroopers or assault glider troops of the late war. This will apply not only to personnel but also to materiel, and far-reaching moves have been under way for the last two or three years toward designing and procuring much lighter equipment.

The Aviation Engineers showed the way in their development of air transportable scrapers, rollers and other equipment for clawing emergency landing strips out of the jungles behind enemy lines in New Guinea, Burma and elsewhere. Ordnance is working hard to get much lighter field pieces, mobile guns, mortars, etc. Signal Corps and AAF, working with the labs and industry, were able to substantially reduce the size and weight of much valuable radio and radar equipment, so that it could be airborne. Along with this went the development of military cargo planes, of which the Fairchild C-82 *Packet* is an outstanding example, and cargo carrying gliders. It is estimated that 1,100 *Packets* could carry an entire infantry division and all its equipment. A revolutionary "air trailer" is under development which will save take-off and landing time.

A good example of "vertical envelopment" with its resulting advantage of tactical surprise, was General Kenney's saving Port Moresby by flying an entire division of 15,000 fully equipped troops across the Coral Sea and over the Owen Stanley Mountains, and keeping them supplied to the tune of 2,000,000 pounds per week until the victory was won. Soon after that the I Troop Carrier Command was organized, eventually serving in all theaters. Its motto was, *Vincit qui primum gerit* (He who gets there first conquers).

Status of U. S. Jets

At a recent meeting in London, Air Commodore Frank Whittle made some comments on what he had been able to observe on the progress of aircraft gas turbines in America during his lecture tour last summer. He reported that the British held a substantial lead in this field, and when pressed, he reckoned it might be as much as two years.

Owing to British developments in the mid-1930's and the fact that the British Air Ministry and several important companies

have gone all-out on jets, there is no question as to their leadership at the present time. It may be open to argument as to whether two years is a correct figure, and also what the relative status will be say five years hence.

Here are some of the factors that should be taken into account in arriving at an estimate of the present position. First, an intangible. The British have in successful operation four Whittle-type turbojets with centrifugal compressors, the Rolls-Royce *Derwent V* (4,200 pounds of static thrust) and *Nene I* (5,000 pounds), and the de Havilland *Goblin II* (3,500 pounds) and *Ghost I* (5,000 pounds). The U. S. has one, the Allison-built J-33-GE (4,200 pounds of thrust), power-plant of the P-80. The British have one axial-flow turbojet, the Metropolitan-Vickers F3, which is matched by the U. S. J-35-GE, power plant of the XP-84 *Thunderjet*, and several other fighters and bombers under development; both have a present rating of about 4,000 pounds of thrust. In the propjet category the picture is even worse. The British have the Bristol *Theseus* and Armstrong-Siddeley *Python*. The Rolls-Royce *Trent* (*Derwent I* geared for propeller) is already obsolete with their new, intricate *Clyde* and smaller, simpler version known as the *Dart*. Armstrong-Siddeley also has a smaller propjet called the *Mamba*. Not all of these are flying yet, but some are, with the others in advanced stages of test, and still other larger and smaller units under development, not yet announced. The U. S. has the General Electric TG-100 (AAF, T-31), period. Sure, there are lots of others cooking, by General Electric, Lockheed-Menasco, Wright, Pratt & Whitney, Allison, Packard, Westinghouse, Allis-Chalmers, Northrop-Hendy, and probably many others, but what do we know about them? This country is not exactly famous for hiding its light under a bushel, so it must be assumed that most of them have a long way to go. It can hardly be altogether blamed on military hush-hush.

Another angle is operational endurance of turbojet engines. A *Derwent I* which was built in June 1944 has completed 1,000 hours of test running, several have done more than 500 hours, and *Goblin I* units have completed more than 500 hours. Initial period between overhauls of the *Derwent I*, original power plant of the *Meteor*, was 90 hours, increased to 180 hours after a few months, now running at 270 hours, and soon to be stepped up to 360 hours. This is far and away ahead of American performance at the present time.

Take the export picture. Not only are Sweden, France, Switzerland, Canada and Australia buying and/or building de Havilland *Vampire* jet fighters, but *Goblin* and *Nene* turbojets are to be built in some of these countries. In this country an organization is already set up to manufacture the Rolls-Royce *Derwent V* (power plant of the record-holding *Star Meteor*) and the *Nene*, beginning with assembly of delivered components, and working up to complete manufacture, as the engineers concerned are convinced that these units are better than anything now available in the U. S.

All this (and more behind the scenes) shows that jet-wise this country needs a shot in the arm. It will mean funds and man-hours for research and development, as well as a bit more imagination and enthusiasm somewhere along the line. Whittle said that Rolls-Royce alone was doing as much as all the American firms put together. N.F.S.

For Performance, Economy, Safety... you get *More for your Money* in a Cessna



You Take Off Safely in a Cessna in winds that ground most light planes. And you really go places with a top speed over 120 m. p. h.... and 4½ hours cruising range on 25 gallons of fuel.



Two People With 80 Pounds of luggage can travel 1000 miles for \$12.50 for gasoline and oil... about ½ cent a mile per person. No schedules. No reservations. Just get in your Cessna and go.



Exceptionally Good Stall Characteristics are engineered into the new Cessnas. Full-range flaps mean safer short-field operation. And the patented safety landing gear combats ground looping.

Think Of All the gay, exciting places that you've been wanting to visit for years, but never had the time. From now on, you can always be "among those present" at Mardi Gras... the Kentucky Derby... the World's Series. It's just a matter of easy hours, when you fly your own Cessna. As for the businessman, he can call on 3 times as many prospects in a territory... stopping at many places that can't be reached by scheduled airline flights.

Priced at only \$3245 (f. o. b. Wichita), the Cessna 140 gives you all-metal structure, 85 h. p. Continental engine, a service ceiling over 15,500 feet and many more features. The 120, at only \$2695 (f. o. b. Wichita) is essentially the same fine airplane, minus starter, generator, battery, flaps, and with less luxurious interior appointments. See these Cessnas at your dealer's now... they're both *more for your money!*

CESSNA AIRCRAFT COMPANY, DEPT. S, WICHITA, KANSAS





TOWNS AND CITIES, without airmarking such as above, encourage low-flying over their populace, for a lost pilot is a nosey fellow who must know where he is

HANGAR FLYING

For the Wayward Pilot

SAN CARLOS, CALIFORNIA—The photograph, above, was instigated and carried through to completion by a private pilot, Eddie Husted of San Carlos. The cost of the sign was contributed by the merchants of the city and with the backing of the Chamber of Commerce the fund was over-subscribed. The over-and-above sum is remaining in the fund to maintain the sign permanently.

The sign is 80 feet long and the letters are 10 feet high. Painted in CAA approved style, bright yellow with black outline, it is laid out True North and South.

The next time some of you pilots get together and feel like "painting the town red," you might try Husted's formula and earn the gratitude of private flyers.

No Drift Correction Here

MONTICELLO, NEW YORK—The longest golf drive on record, more than 130,000 yards, was made by Billy Vine when he was golfing and staying at Monticello's New Concord Hotel . . . part of the hotel's golf course has been turned into a landing field for the hotel's twin-engine Cessnas. Vine's drive drifted a little with a strong crosswind and landed inside the cabin of one of the planes just as the door closed, carrying the ball to LaGuardia field—75 miles away.

A 1947 Pony Express

DENVER, COLORADO—Foster Auto Supply of Denver has a salesman—it's George B. Brown . . . who uses a plane to cover his route. In addition to getting business from his regular accounts in Wyoming, Nebraska and northern Colorado, he sells to the airports at which he makes his landings. By

flying the territory, Brown has been able to expand his business returns by more than one third the former volume. His plane expenses have been no greater than his automobile—and this notwithstanding the fact that he saves hours of traveling time which he spends on the ground with his customers.

This is News

LOS ANGELES, CALIFORNIA—Thorpe Aircraft Company, headed by John W. Thorpe, former Project Engineer for small planes of Lockheed Aviation, has an all-metal two-place plane that will retail at \$2,000. Thorpe, himself, expects eventually to get this under \$1,000.

Following are a few of its specs:

Engine: 75 hp
Cruising, 10,000 feet: 120 mph (75 per cent power)
Endurance: 4 hours
Gross weight: 1,050 pounds
Take-off run: 250 feet
Over 50 feet obstacle: 725 feet
Landing ground run: 170 feet
Over 50-foot obstacle: 490 feet

Needless to say orders have already been accepted on the Thorpe plane, which will be known as the *Sky Scooter*.

Can You Top This

SAN ANGELO, TEXAS—Texas whirlwinds, like dancing flames, are fascinating to watch.

But three flight school operators at Sky Harbor Airpark, situated right beside San Angelo, recently had cause to find their hearts in their throats when a specimen of this circular wind tiptoed stealthily toward one of their newest Piper *Cubs* that was parked in front of their administration building.

The tiny craft began shivering with what appeared to be anticipatory delight when the outer edges of the "whirligig" toyed with her wingtips.

Then, to the amazement of owners Rogers Livingston, Louis Riedl and I. L. Elwood, she leaped about four feet into the air, did a perfect 360-degree turn (without banking) and settled back to within a few inches of her former position.

Tie-down ropes were installed that day.

Women Flyers of America

NEW YORK, NEW YORK—National Headquarters of Women Flyers of America, Inc. 274 Madison Avenue, New York City, has announced their sixth annual membership drive since incorporating. Mrs. Vita F. Roth, President, besides holding the woman's high-altitude record parachute jump, is the woman responsible for the high standing of the WFA. In her own words this non-profit organization was formed " . . . to guide and prepare women in the various phases of aviation."

So successful have they been, Glenn L. Martin, President of one of the world's leading aircraft companies, in commenting on the organization stated: "They have established an excellent record . . . are responsible for encouraging many thousands of young women to take to the air."

Local chapters are in all but a few of the leading cities in the U.S. and most distant Chapter is located in Hawaii.

Through local Chapters WFA obtains special flying rates for their members whenever possible, conducts Government approved ground school courses, and with a National Headquarters assistance, renders service to their members on an individual basis.

Airport Sign

SIOUX FALLS, S. DAK.—Westport Airfield's Western Flyers, Inc., is showing visible signs of attracting pilots to land there. Picture below shows first completed sign—WESTPORT COME ON IN. Others will read FOOD and CAR TO TOWN. Letters are dug into the ground then filled with crushed rock and painted white. If the power of suggestion is everything it's cracked up to be, Westport should attract a lot of transients.

The next time a cold front sets in over your airport, fixed base operators, and you're digging up things to do, the letters are 20 feet long with 10 feet between each letter—and the ground is softer digging in the rain.

WELCOME MAT is visible from 5,000 feet



You Can Start Your A & E TRAINING NOW!

**Master Airplane and Engine Mechanic
Training Approved for Veterans**



The critical shortage of aviation training facilities is temporarily relieved through the reopening of famous Cali-

ifornia Flyers School of Aeronautics. It means a *limited number* of young men can start their aviation career training *at once*. This situation is, of course, temporary and must be taken advantage of *immediately*. For California Flyers' initial classes—due to a policy of limited enrollment—will soon be filled to capacity.

One of the oldest aeronautical institutions in the country

Founded in 1930, California Flyers School of Aeronautics is one of the oldest and most respected aeronautical institutions in the nation. Prior to the war it trained hundreds of young men, and today its graduates are holding responsible, high-salaried positions in every field of aviation all over the world. Because of its enviable record it was selected by the Army Air Forces to train over 5,000 mechanics, a job that earned a citation for merit. Now, with its war projects completed, California Flyers is free to accept civilian applicants.

Practical career courses in aviation mechanics are fully approved

California Flyers offers practical, industry approved career courses in Master Airplane and Engine Mechanics, Airplane Mechanics and Airplane Engine Mechanics. These courses are approved under the G. I. Bill of Rights and Public Bill 16, and have been extended the highest possible rating by the Civil Aeronautics Administration.

California Flyers offers every advantage to the aviation mechanics trainee

California Flyers is located in the heart of the world's greatest concentration of aviation activity. Its buildings are ultra-modern, its shops complete with up-to-date equipment, and its faculty is industry trained and approved. Training is practical with emphasis on *individual* instruction under California Flyers' unique

Participation-Group Instruction system. Proof of its superior training is its thousands of successful graduates.

You get credit for experience at California Flyers

An important feature at California Flyers for students with previous aviation mechanics experience is the extension of scholastic credit for this experience as demonstrated by the student in his ability to make progress throughout his training and to the limits allowed by the C.A.A.

Housing facilities for single students

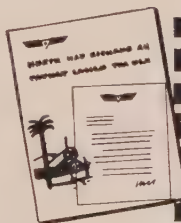
California Flyers has made arrangements for housing of single students in approved private homes.

Clip this coupon today

The unusual training opportunities resulting from the reopening of California Flyers must be acted upon immediately. Phone, write or air mail your application *today*. Even if you do not plan to enter for months or a year, you should act *now*. Write for complete information and make your reservation as soon as possible.



SCHOOL OF AERONAUTICS
720 S. REDONDO BOULEVARD, INGLEWOOD, CALIFORNIA



Write for Brochure...

Write today for free illustrated brochure describing courses, curricula and opportunities at California Flyers.

CALIFORNIA FLYERS

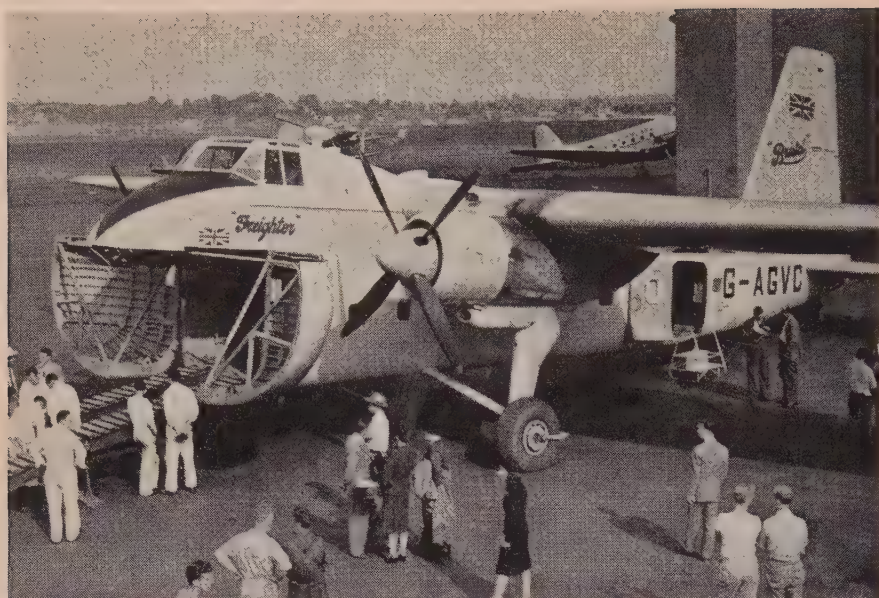
School of Aeronautics, Dept. S-1
720 S. Redondo Blvd., Inglewood, Calif.

Please send me illustrated brochure containing full information about courses, tuition, etc. and application blank. I understand this will not obligate me in any way.

Name _____ Age _____

Address _____

City _____ Zone _____ State _____



LOADING FEATURES of aircraft is all-important in air freight operations. British Bristol Freighter, above, has portable ramps and clam-shell type doors in nose

BRITISH AVIATION NEWS

LONDON: Having recently arrived back from a visit to the United States where I enjoyed good living and good-weather air travel, I may be excused for feeling somewhat jaundiced about life in general and aviation in particular. Nevertheless, over here this past month has been marked by two important events in the annals of British civil aviation. Civil Aviation Bill, after being hotly contested in Parliament, became law. Also in the last month of summer the fastest air race ever to be held in this country (not even excluding the Schneider Trophy races), and the first air race ever to include jet-propelled aircraft, took place.

To take first things first, the passing of the Civil Aviation Act means that all Britain's scheduled air services are to be operated exclusively by three State corporations. The British Overseas Airways Corporation is to operate the North Atlantic, Empire and Far Eastern routes. The British South American Airways will operate from England to South America and the British European Airways will operate the Domestic and Continental services. Nobody else will be allowed to operate a scheduled air service, although private concerns can operate air-charter services as best they may with the comparatively limited facilities which are now available to them.

The Lympne (Folkestone) air races took place over a quadrilateral course of 19 miles which has to be completed in three laps. The High Speed handicap race, for aircraft with speeds of over 300 mph, provided the greatest thrills for the thousands of spectators who lined the cliff-tops at Folkestone and the 700-foot high downs behind the town. First over the finishing line came Geoffrey de Havilland, flying a single-jet propelled *Vampire I* entered by the de Havilland Aircraft Co. Owing to an error in the start, however, the *Vampire* was sent off too soon and, on an adjustment of the time, was

placed second with an over-all speed of 427 mph. The winner on handicap was Bill Humble, test pilot for the Hawker Co., flying a *Fury I* at an average speed of 342 mph. G. H. Pike, flying a *Hornet I*, came third with a speed of 345.5 mph.

At Nat'l Air Races in Cleveland, Ohio, on September 2, Major Gus Landquist, flying a P-80 in the jet division of the Thompson Trophy race, won first place with a speed of 515.8 mph. Major Robin Olds, also in a P-80, placed second with a speed of 514.7 mph, and Capt. Alfred Fell, third, with 509.3 mph. The course consisted of 6 laps of 30 miles each or 180 miles—Ed.

The speeds recorded by the first three aircraft are remarkable when considered in relation to the course. The length of the longest leg was only 9 miles, a matter of less than one and a half minute's flying time for Geoffrey de Havilland, yet his cornering was delightful to watch—no suggestion of pulling the wings off or of pushing himself out through the floor, in spite of recording accelerations which were reputed to be in the neighborhood of 6 G. High-speed racing over a closed circuit is interesting to the experts and provides plenty of thrills for the spectators; I hope we may see a lot more of it.

Flying Club activities are building up but, I am afraid, not so fast as we could wish. The reasons for the slow build-up are probably high costs, gasoline restrictions and weather—in that order. Flying club rates for dual average from 12 to 16 dollars an hour and, for solo flying, around 12 dollars an hour. Aircraft used are mostly Taylorcraft, Pipers and those hardy perennials the D.H. *Tiger Moths*. Used aircraft of light types are advertised at around 2,000 to 4,000 dollars. Recently, the Ministry of Civil Aviation has increased airport landing charges so that a single landing on a runway field now costs \$2.50 for an ultra-light aircraft. Altogether, one has to be fairly rich

over here to become airborne! Some private flyer friends to whom I showed my September copy of *Skyways* nearly wept with envy at seeing the advertisements and the descriptions of private aviation in the United States!

The Guild of Air Pilots and Air Navigators of the British Empire (G.A.P.A.N., for short), which was formed in 1929 to protect the interests and uphold the status of pilots and navigators of the air, has recently been honoured with the acceptance by H.R.H. Princess Elizabeth of its request for her to become its Grand Master. The previous holder of this office was H.R.H. the Duke of Kent, who lost his life in the crash of the *Sunderland* flying boat in 1943. The acceptance of the office of Grand Master by the next-in-succession to the Throne is a signal honour for the Guild and is a further indication of the close interest which the Royal Family has always displayed in Civil Aviation. The King's Flight, incidentally, has just taken delivery of a Vickers *Viking*, the first of four on order. It is interesting to note that the seat which the King will occupy is to face aft, an added safety precaution which might well be copied in other transports.

TAILPIECE. IS THIS A RECORD? It has been reported that a bold and enterprising aviator by the name of Mr. Cecil Packer was recently flying his Piper *Cub*, when he was surprised and mortified to see a snake coiled around the rudder-bar. He is reported to have executed a prudent but hasty forced landing in a field, where he collected a stick and ejected the air-minded reptile from his aircraft. I should add that the snake was a real one and not one of the top-hatted variety which is sometimes seen, swinging a gold headed cane. Anyhow, the incident excited sufficient comment to be worthy of a leader in the *London Times*. It would be interesting to know if any of your readers have come across similar incidents in the U.S.A.

Yes, in the above-mentioned September issue, as a matter of fact, we mentioned a similar incident which took place in the States. It was on page 71, *Hangar Flying*.—Ed.


Postscript

I am afraid I have to start this on a note of tragedy. Thirty-six-year-old Geoffrey de Havilland lost his life whilst testing the latest jet-turbine powered product of the firm bearing his name, the D. H. 108. The 108, powered by a single de Havilland *Goblin* engine, was to have attacked the world speed record over the same course at which it was gained by the RAF *Meteor*, with Geoffrey at the controls. The precise cause of the accident has not yet been established and no trained observers appeared to have seen it happen, nevertheless, the recording cameras have been salvaged and the general opinion here is that he was nosing into the supersonic range and compressibility was to blame.

To strike a more cheerful note, the first postwar meeting of the Federation Aeronautique Internationale was held in London recently. Fourth president to be elected since the federation was established in 1905 was Lord Brabazon who, as J. T. C. Moore-Brabazon, holds Private Pilot's License No. 1 in this country. Many matters important to international private flying were discussed.

Incidentally, in connection with the F.A.I. meeting, I note that the number of privately owned aircraft registered in Britain is 153. This is a pathetic figure when compared with your thousands.

Richard C. I. Pearse A.R.Ae.S.



A LOOK AHEAD

As 1947 begins, we at Lear look forward to serving the aircraft industry even better than we ever have before. Production difficulties are clearing up. Materials seem headed toward more ample supply. And wartime developments are rapidly being turned to peacetime advances.

Soon Lear will have available superior automatic pilots that weigh only one-quarter to one-half of older models. There'll be a new automatic radio compass only half the weight of its predecessor.

And there'll be a special combination VHF transmitter-receiver, a revolutionary omni-range converter, and a new advanced marker beacon receiver.

As you can with all Lear equipment, you'll find these new devices at your favorite aviation dealer's. For any established aviation dealer or operator can purchase Lear equipment from the Lear distributor.

In this way, we feel, Lear can best serve the interests of the aviation industry.

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Night Flying

By L. A. LOUIS

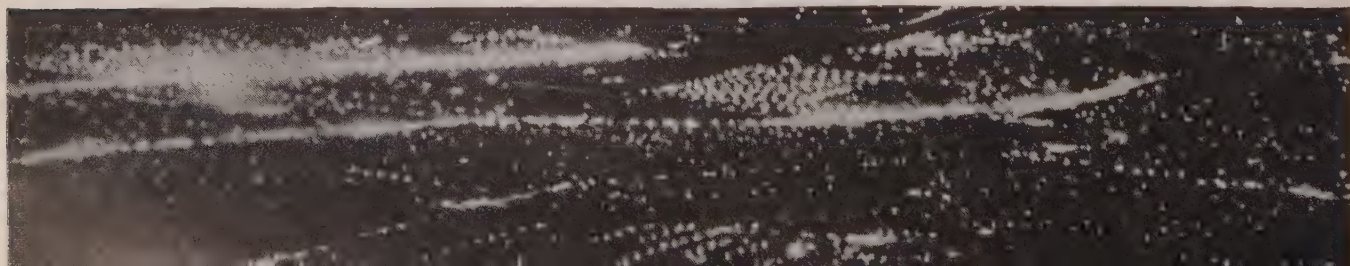
If you've never flown at night, try it . . . and here are a few tips to make your night flight more fun and easier

LET any pilot tell you when he prefers to fly—and 10 to one says he'll choose a night flight. Under the myriad of stars, it seems as though your flight were the synthesis of all the feats ever looked upon by Virgo, Pegasus or Libra. The dark world beneath you has a way of rounding off on

the edges as though your position, in relation to the earth, were that of another planet. Another planet—but one with wings.

In the light of day, the towns below you are green-foliaged plots with gray ribbon streets. But at night, from 5,000 feet, towns and cities appear beneath your wings as an exquisite array of jewels, with the neon signs becoming rubies, emeralds, diamonds and sapphires. Yes, night flying offers a brand of pleasure all its own, but it also requires more alertness and greater care.

One of the idiosyncrasies about night flight is your vision. Faraway objects appear much closer





than they actually are. For example, in a flight over the Santa Catalina Mountains of Arizona between the hours of sunup and sundown, to the airline passengers and pilot alike Lemon Peak north of Tucson appears to be 50 miles to the starboard side. But at night . . . it seems to jut into the dark sky right at your wing tip.

Be certain to remember this antic of vision! Despite such optical illusions, however, night take-offs and landings are executed with ease.

Take-offs call for more attention to the plane's instrument panel (altimeter, tach, and, if you have them, gyro instruments) than conditions outside the cockpit . . . except, of course, for careful notice that your path down the runway is a straight one. Other exterior details are obscured to some degree by the smallish glow of the cockpit lights, and to a greater degree by the darkness itself.

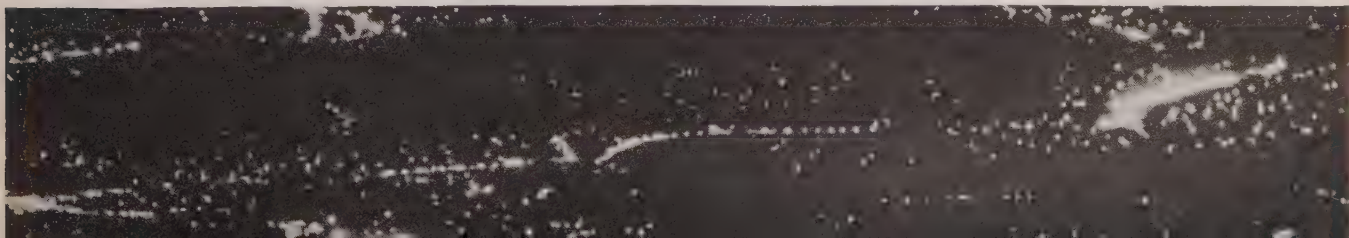
The existence of field obstacles is important, however. If you know the airport and are familiar with its obstructions, don't let that knowledge of conditions tuck you into a state of mental lethargy. Those obstructions are a hazard . . . always keep them in mind and give them wide berth! Transmission

lines, for example, may be no problem at all during daylight operations because you can see them. At night, however, when you can't judge your plane's position in relation to those wires, but have to guess at it, be certain you are well above them . . . and then after you're sure you can clear those wires by a good distance, add a little more clearance . . . !

If the airport is not too familiar to you, before you make your take-off buttonhole a pilot who's practically lived at the field. Ask him all the questions you can think of regarding that field and the surrounding countryside. Every answer adds up to more on the credit side.

It's a good idea, too, if you don't know too much about the airport you're heading for, to ask questions regarding it. Any information in addition to the info supplied on the CAA maps and in the Airman's Guide, is just that much more "flight insurance" . . . and the more of that the better.

Night landings, like take-offs, are accomplished in comparative ease and are fairly simple to perform. Part of this is due to the accepted practice of carrying the plane in with throttle and taking away the power the minute you (*Continued on page 90*)



Navy BuAer— Research

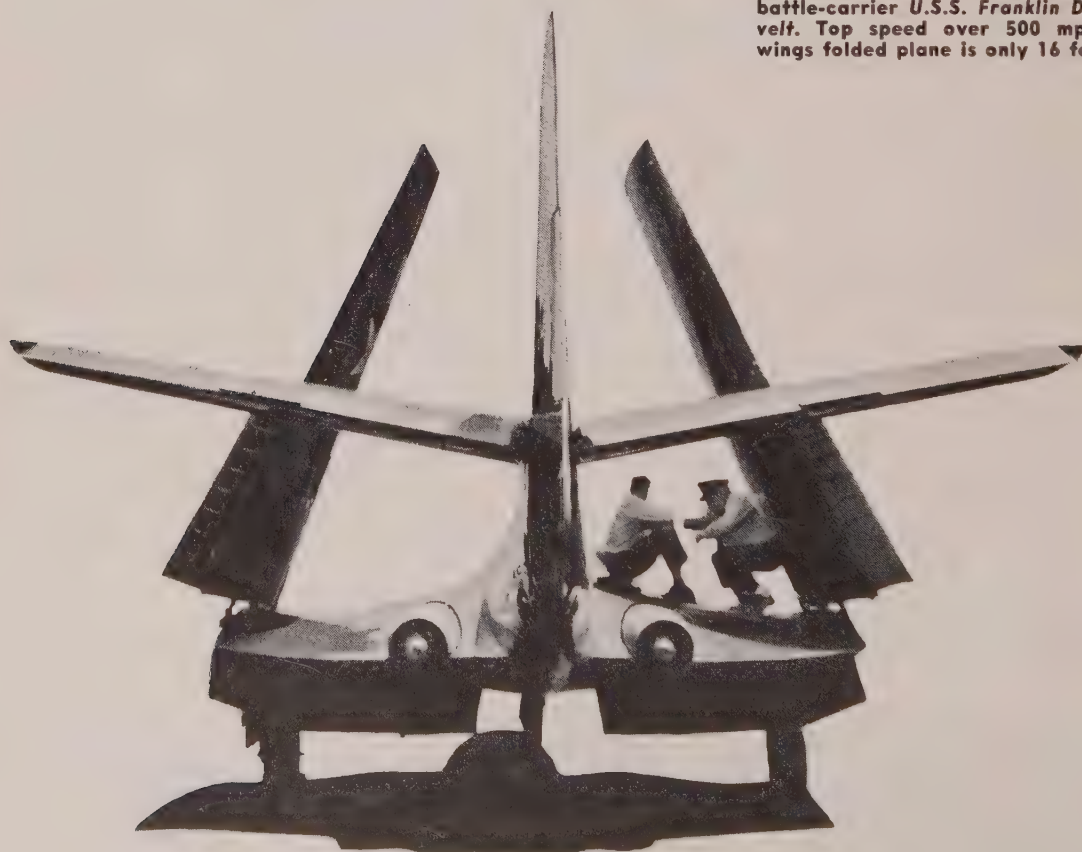
By

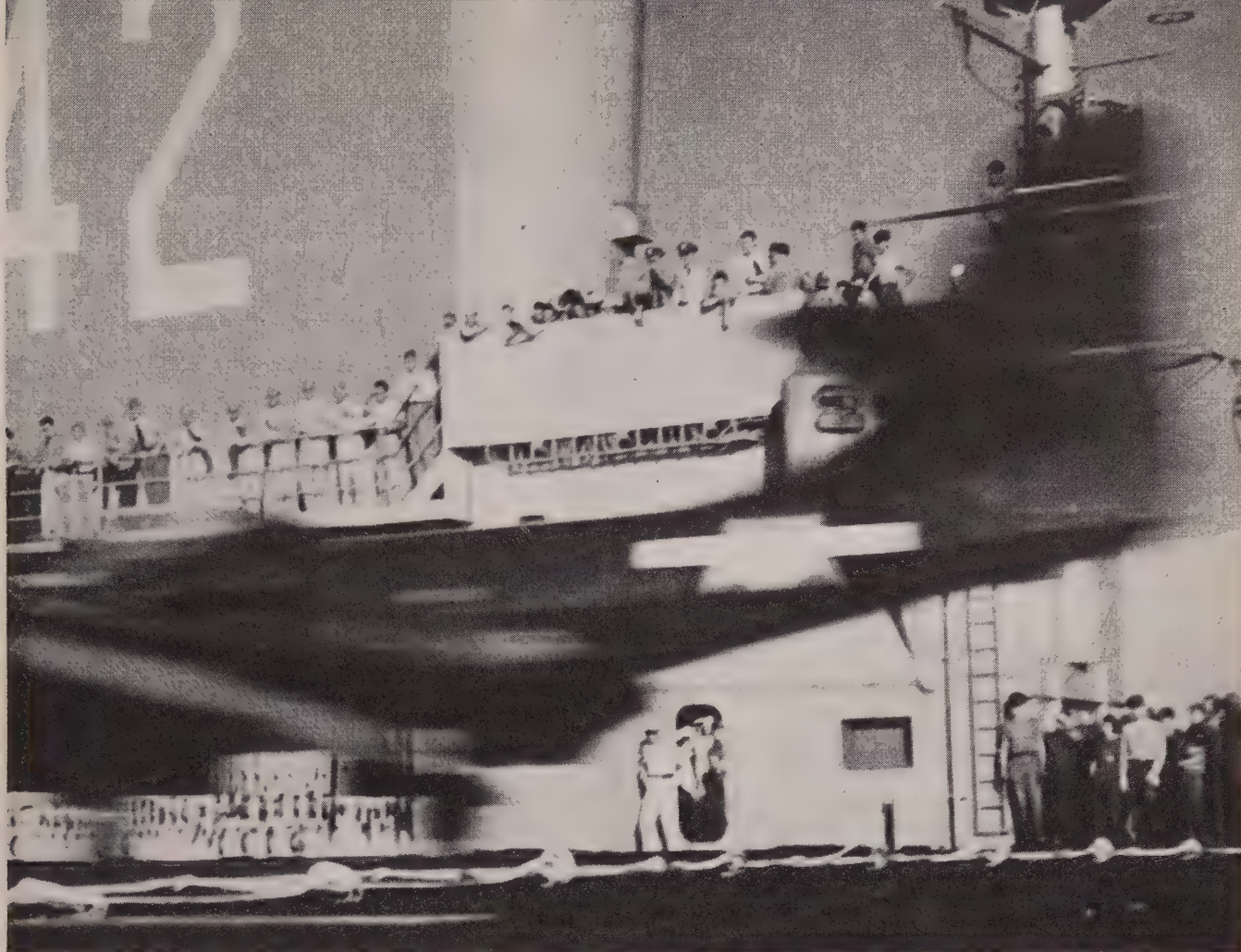
REAR ADMIRAL L. C. STEVENS, USN

Ass't Chief BuAer—Research, Engineering



NAVY'S ALL-JET Phantom (McDonnell XFD-1) takes off from flight deck of big battle-carrier U.S.S. Franklin D. Roosevelt. Top speed over 500 mph. With wings folded plane is only 16 feet wide





THE story of Navy aeronautical research and development is the story of a challenge, the challenge of today, and its answer. For long the skeptics have said that the limitations imposed by ship-based and water-based operation were too great, that naval aircraft ultimately could not compete with land-based aircraft, and finally, must drop behind in the race for technical supremacy. But just as the challenge of the sea has always been a stimulus to man, so has the new challenge of the air created its own answer. This last war saw naval aircraft slug it out with shore-based aircraft on better than even terms. The challenge of the air is continuing to be met, and it is for this that the Naval aeronautical research and development program exists.

Aircraft which result from this program are, and must be, fundamentally different from their shore-based contemporary aircraft. They are designed for the job from the start. The Vought *Corsair*, springing from the first U.S. prototype of either service which recorded an actual 400 mph in still air, resembles the AAF P-51 *Mustang* in only one respect: both are top-notch fighters. Otherwise, they are fundamentally different in conception and in the working-out of the designs. Certain

obvious special features of the *Corsair* include the arresting hook and catapulting fittings which facilitate landings and take-offs on crowded ship decks. Folding wings afford an obvious means of increasing the number of airplanes which can be spotted on deck. Less noticeable are special features of design which permit the required precision and control in low-speed flight for accurate landings in the ships' arresting gear, or for safe "wave-offs" at the last split second, when conditions require the pilot to go around again.

There are dimensional differences measured in inches to adapt the airplanes to the ships. Lowering the tail surfaces a small amount may increase the density of spotting by permitting the tail to slide under the wing of an adjacent parked airplane, or a change in length of an inch or two may permit two airplanes instead of one to ride the giant elevators in the aircraft carriers. When the British used our *Corsairs* during the war, they had to build special wings for them because of the lack of only a few inches to make them usable on British carriers.

The special features of naval seaplanes are equally striking, equally fundamental and equally deep-seated. As for their capabilities, the great Martin *Mariner* flying boats were (Continued on page 60)



Air Picnic

If it's flyin' and fun you want, never pass up an opportunity to get in on an Arizona air picnic

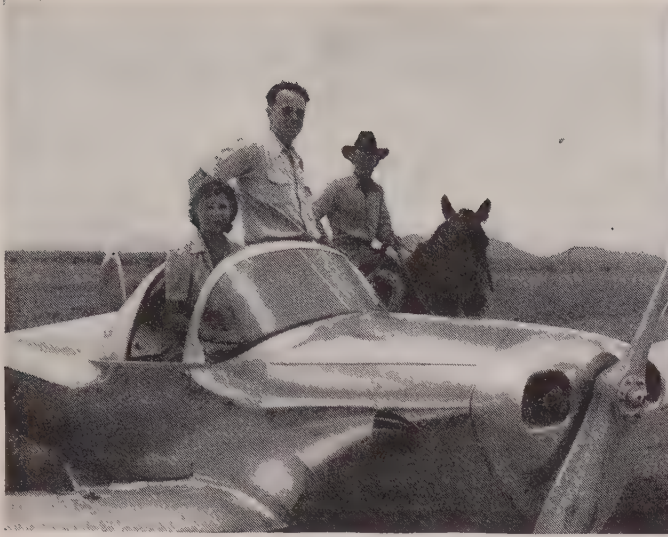
By **TAMARA ANDREEVA**

ALANKY, sunburned lad walked up to an antiquated gas station phone in Tucson, Arizona, and vigorously turned the crank. There was a buzz, a splutter, and five different people picked up extension phones to answer; finally the right party's voice came over the wire.

"That you, Al?" the lanky youth drawled. "It's me, Bill Sparks. Yea, Sparky. Say, we have a gal

here from Los Angeles who's never been to an Arizona air picnic. What say we get some couples together and fly out for some chow in the hills, some fishin', and maybe some shopping in Mexico? Between me and a couple of other fellas we got things all figured out. What's that? All you have to do is pass the good word along. We know you're lazy. We aren't askin' you to do any work! Wait a minute, speak a little louder. This is the original Shouting Circuit. Yea, we'll be startin' early from the Tucson Municipal airport at six tomorrow."

There was a thoughtful silence on the wire, then



AIR PICNICKERS include Mr. and Mrs. Al Hudgin. They in their *Ercoupe* took off with other flyers at 6:20 a.m.



FLYING IN PAIRS the 10 planes winged their way toward the Mesa, in very smooth early morning air

Al Hudgin's voice came in. "What do we bring?"

"Oh, just anything," Sparky tossed off. "Make it a ham, preferably, a side of bacon—or just about anything. And don't forget the *Ercoupe*." "Roger."

Al hung up, only to yank his phone's receiver off the hook the next moment and call his friends. From that minute on plans for the Air Picnic developed like a combination of assembling a posse and preparing for a Church Social. Party lines buzzed all over the hot desert countryside; tempers flared. But orders for bacon, donuts, coffee, gas stove, and plenty of participants were delivered and acknowledged; riders for the other cockpit and pilots were put in contact with each other.

Though at first completely casual, such arrangements were no news to Arizona pilots. Several had previously participated in air assemblages which demanded efficiency and speed. Just before the War several had been out on a mountain rescue party where a group of out-of-town dudes had hiked into the mountains and lost their way. In 1939 they were part of the Sheriff's posse looking for stolen

automobiles. They had discovered an entire stolen auto car lot on the desert. Markers and supplies were dropped by private pilot volunteers during brush fires. Though not an official club, the group is closely banded together with good fellowship and one person's troubles is shared by all. Whenever, on a long flight, one plane is lagging or is overdue, two or three will turn tail to chase down the trouble and give escort in case of a forced landing or engine trouble.

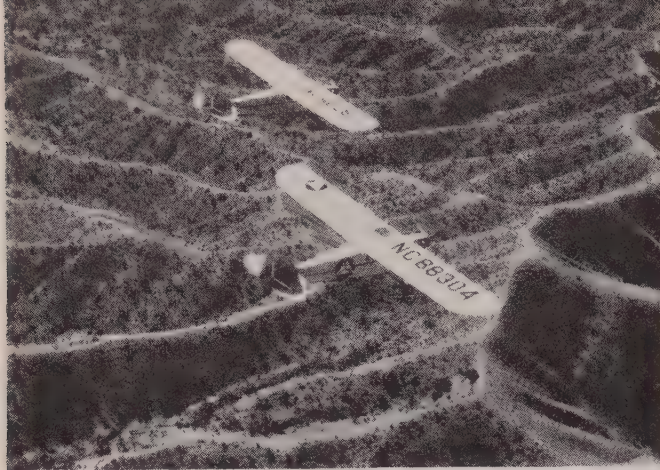
One pilot, who chooses to remain anonymous, had made a risky landing on a rocky and wild mesa in the mountains to take a doctor and medicaments to a sick cattleman. Two have assisted the authorities in a search for a lost pilot. But this morning there was no inkling of trouble and at six the following morning, dazzling bright with the desert sun but still cool, 18 people and their planes assembled at the Tucson airport, ready for the takeoff.

At a little snack bar, appropriately enough christened the Chew'n Choke, plans were formulated over coffee. The Mesa would be the first hop; Tully's airport on the American side of Nogales,

FIRST STOP was at the Mesa where breakfast was order of the day. Here J. Gwinner fills Dr. Brown's cup

GOTCHA, says a picnicker armed with a camera. Note boots and airmap, rather a bit of the old and the new





NOGALES next, and a pair of *Cubs* fly in formation after take-off from the Mesa. Its elevation—5,100 ft.

Mexico, next, and on the way back everyone would stop for some boating and fishing at Kinsley's ranch. A cattleman of no mean importance, Kinsley realized that bigger profits followed a speedy operation. He decided to forego other mechanized equipment in favor of a plane which enabled him to make quicker contacts, consummate more deals than his competitors. Aside from being used for his own needs, his homemade airport is a favorite stopover for private pilots, always welcome to a cool drink and sandwich on the house.

It seemed that no one was in any particular hurry and that the party would never get started on time. But exactly at "six twenty," as per schedule, the lead plane, an *Ercoupe* with a local garage operator at the controls, nosed into the wind, and taxied for a take off. "Schumaker is an old boy scout," Al Hudgin grinned. "That is why we are sending him on ahead to rub two sticks together. He can get the fire started and we'll have breakfast on the Mesa just as soon as we arrive."

A *Cub*, carrying a coffee pot and donuts, took off next. It was followed by other supply planes in order of their importance to the breakfast menu. Somewhere in the middle of the procession was an Aeronca with a dude (me) and a *Cub* with Sparky piloting and Ross Madden taking aerial shots.

The Mesa is an amazing natural airport atop a small hill surrounded by towering 5,000-foot peaks



MEXICO was the attraction for the picnickers who wanted to shop. Here Mexican photog shoots a few

of the rugged Catalinas, not far from Old Baldy. The story goes it was discovered by Al's brother Palen while he was a-courtin' his gal, and lookin' for a nice private spot to park his *Cub*.

The Aeronca in which I was traveling, with Mr. Briggs, local businessman, piloting, landed right after Schumaker's *Ercoupe*. We did not bring any supplies, but we had plenty of determination to help both with the cooking and the preparing of the breakfast. Since there is no landing fee at the Mesa, our price of admission was picking up small stones to clear the natural airstrip.

In quick succession, though not always in a conventional pattern, the *Cubs*, *Ercoupes*, Funks, Aeroncas and T-crafts, 10 in all, landed and taxied into a picture lineup. Practically everybody turned up with a camera, and there was plenty of picture-taking and posing while the best cooks in the bunch fussed over breakfast. The artistic souls picked some mistletoe for a "centerpiece." There was quite some wise-cracking when a newly-engaged couple wandered off by themselves to look for some more of the "kissin' weed."

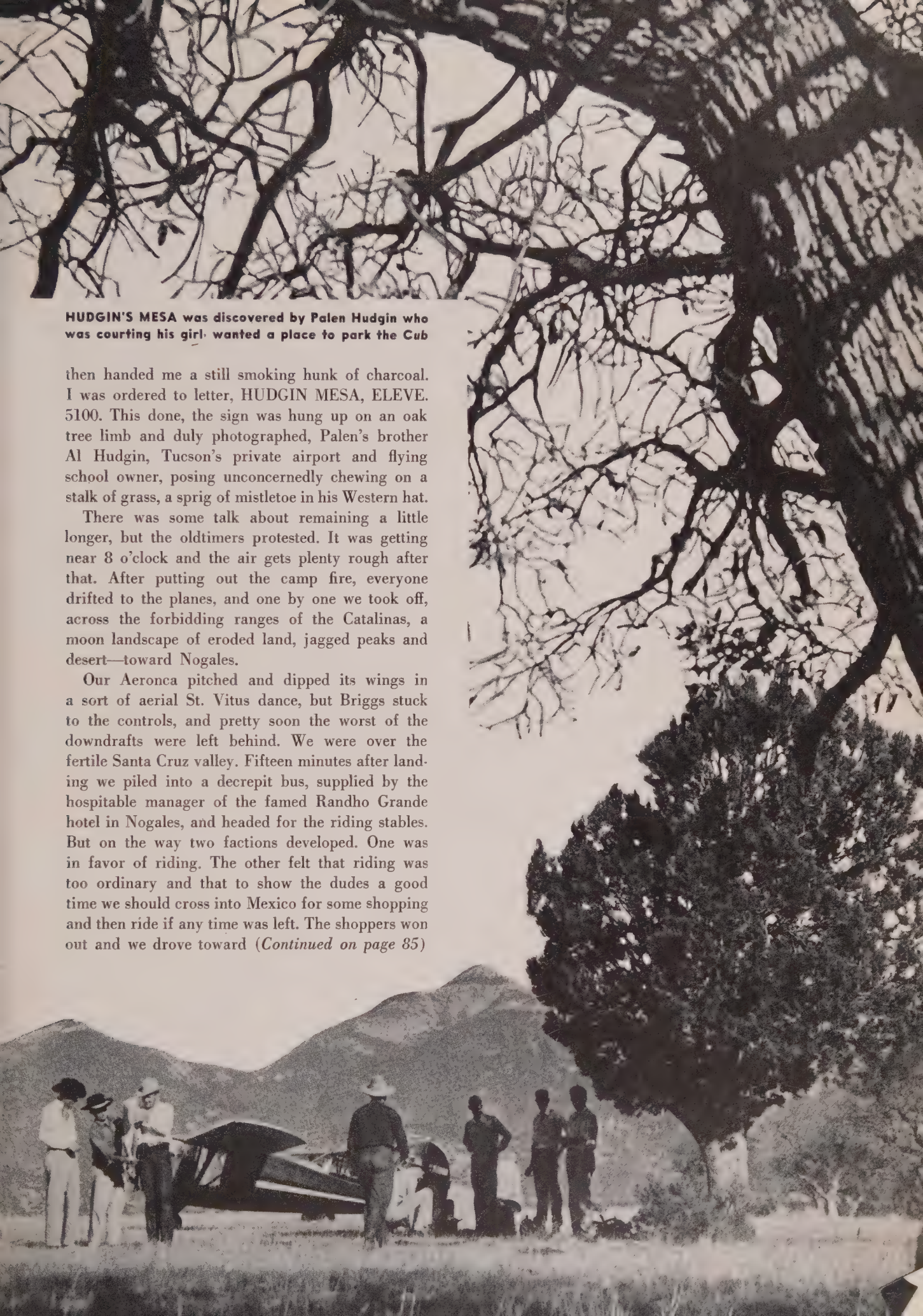
Breakfast over, the male contingent scattered over the Mesa to pay the admission price by picking up and tossing away boulders and larger stones. After that it was decided to commemorate the occasion of the picnic by naming the Mesa after its discoverer. Someone found a piece of cardboard,

SERENADES were plentiful, too. This group chose to play for Mrs. Savoy and picture-taking Bill Sparks



FISHING for those who liked it was on the agenda at Kinsley's lake. Briggs paddled while Sparky caught one





HUDGIN'S MESA was discovered by Palen Hudgin who was courting his girl, wanted a place to park the Cub

then handed me a still smoking hunk of charcoal. I was ordered to letter, HUDGIN MESA, ELEVE. 5100. This done, the sign was hung up on an oak tree limb and duly photographed, Palen's brother Al Hudgin, Tucson's private airport and flying school owner, posing unconcernedly chewing on a stalk of grass, a sprig of mistletoe in his Western hat.

There was some talk about remaining a little longer, but the oldtimers protested. It was getting near 8 o'clock and the air gets plenty rough after that. After putting out the camp fire, everyone drifted to the planes, and one by one we took off, across the forbidding ranges of the Catalinas, a moon landscape of eroded land, jagged peaks and desert—toward Nogales.

Our Aeronca pitched and dipped its wings in a sort of aerial St. Vitus dance, but Briggs stuck to the controls, and pretty soon the worst of the downdrafts were left behind. We were over the fertile Santa Cruz valley. Fifteen minutes after landing we piled into a decrepit bus, supplied by the hospitable manager of the famed Randho Grande hotel in Nogales, and headed for the riding stables. But on the way two factions developed. One was in favor of riding. The other felt that riding was too ordinary and that to show the dudes a good time we should cross into Mexico for some shopping and then ride if any time was left. The shoppers won out and we drove toward *(Continued on page 85)*

OUTER SPACE

250 MI.

200 MI.

150 MI.

100 MI.

50 MI.

OUTER EDGE OF ATMOSPHERE

AREA OF GREATEST MESON ACTIVITY

STRATOPAUSE

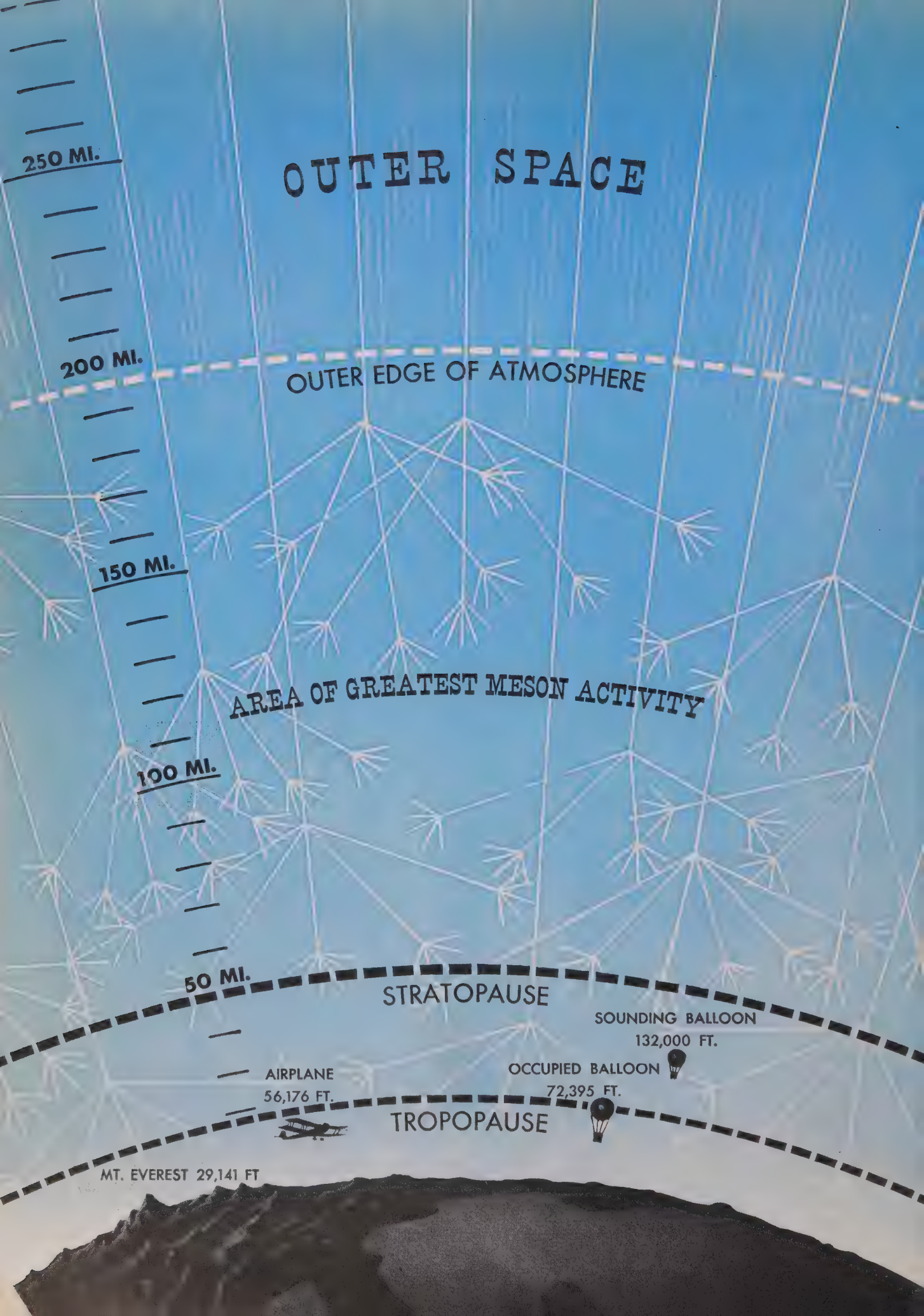
SOUNDING BALLOON
132,000 FT.

AIRPLANE
56,176 FT.

OCCUPIED BALLOON
72,395 FT.

TROPOPAUSE

MT. EVEREST 29,141 FT



The Cosmic Ray

The cosmic ray travels at a speed of about 185,000 miles a second, but the question is . . . is it friend or foe

By CAPT. IVIN M. WISE

THE last few months have seen the interest and enthusiasm of leading scientists and researchers centered on something fairly new in our everyday vocabulary—the Cosmic Ray. With the spotlight of attention focused on the stars of the past year—atomic energy, jet propulsion, supersonic flight—minor attention has been given to a little “extra,” which may yet steal the show.

Occasionally the reading public has been told of basic research being conducted by our AAF, the Navy, and leading science organizations. The extent of this research clearly indicates that all are very much concerned about what goes on in outer space—outer space being that area which extends upward from 54,000 feet.

Unfortunately, due to the lack of accurate knowledge of the cosmic ray and its by-products, much confusion has been added to the news accounts of these activities.

For example, we have heard strong rumors of the development of a cosmic ray bomb, supposedly a thousand times more powerful than the atomic bomb.

Before we become terrified, however, at the thought of such a powerful weapon in the hands of another nation, let us remove the cloak of mystery from the cosmic ray and take a clear look at it.

In the first place, the cosmic ray is not a ray at all, at least not in the popular conception of the term. Instead, cosmic rays are actually tiny particles of matter, so small that even our strongest microscopes could not magnify them to sufficient size for visual inspection. If we could gather enough of them and place them in a bucket, we could see a mass which would have color and shape. In fact, we could probably pick them up in our hands.

These tiny particles are called “protons,” although we continue to call them cosmic rays, since the public has caught on to the latter term and has not yet accustomed itself to “proton.”

Protons originate from somewhere in outer space.

They cannot, however, be placed in the same class as meteors or meteor dust regardless of how minute these particles may be. Meteors and dusts float about in space and the speed with which they strike the earth atmosphere is determined by the speed of the earth itself as it roars through space.

Protons, in contrast, have almost unbelievable speed, or energy. These particles travel at a speed slightly under that of light. It is estimated that the protons, or cosmic rays, travel at about 185,000 miles a *second*! And billions of these protons strike the earth's atmosphere every hour!

However, the relatively thin layer of air which surrounds the globe (some 300 miles of it, which is thin in comparison with the vast regions of space) protects the earth's surface from all but a few of these cosmic rays. (Continued on page 70)



RESEARCHERS Dr. Swann (left) of Bartol, Dr. J. La Gorce, Nat'l Geo., Gen. LeMay greet pilot Col. Key



NEWSMEN get close-up look at XP-84 just after jet speed trial at Muroc. Note the flying wing behind the XP-84. The jet plane set unofficial record of 619 mph

OPERATORS of official timing cameras (left) get set for start of test. Each camera shoots 500 frames per second and are lined up at right angles to course

THUNDERJET passes cameras at more than 600 mph. This was taken by the author using a Speed Graphic, F 8 lens opening, at a speed of 1/1000th second



Sky Speedway

By DONALD CHASE

When new airplane speed records are set, they'll come from AAF's base at Muroc, Wright Field of the West

NEWSPAPER headlines will some day shout that man has at last surpassed the speed of sound. Chances are good that when that record flight is made, it will be made over Uncle Sam's new sky speedway at Muroc Dry Lake in the California desert. Isolated 75 miles from Los Angeles in the sand-and-sagebrush of the Mojave Desert near Lancaster, the Muroc Army Air Base is rapidly becoming the Wright Field of the West; home of the most advanced experimental planes of the Air Materiel Command.

Muroc Dry Lake has long been the site of automobile speed runs. For years prior to the war, this dry lake was used by Southern California racing fans as a speedway for "hopped up" cars and motorcycles. Speeds of over 140 mph were recorded on this lake with custom-built roadsters.

The selection of Muroc Dry Lake as the site for testing experimental jet aircraft goes back to a hush-hush tour in the spring of 1942 covering many sections of the country by Brig. Gen. Benjamin W. Chidlaw, then chief of Development Engineering section at Hq AAF, Washington, and Major (now Col.) Ralph P. Swofford, project officer for jet

aircraft at Wright Field. They hit on Muroc as an almost ideal spot, and by late summer a secret base had been built up, complete with facilities, not five miles away from the regular AAF Bombardment base at Muroc. Nobody there knew just what was cooking, although they could see that something was up, and they didn't find out until long afterwards that during early October, 1942, America's first jet-propelled experimental fighter, the Bell XP-59A *Airacomet* was test-flown there.

Here's what goes into the preparation of a world's record airplane speed test. First the course must be laid out and measured. Federation Aeronautique Internationale (FAI) rules are followed in all international speed tests, and the course must be exactly three kilometers (1.863 miles) in length. The Muroc speedway was measured by the U.S. Coast and Geodetic Survey to within one tenth of a millimeter. Bench markers were set at each end of the course, making a permanent installation for future tests.

FAI rules governing speed runs were established in the days when 300 mph was deemed impossible. These outdated restrictions make high-speed attempts increasingly difficult as aircraft speeds become faster. Four passes, two upwind and two downwind, must be made over the three kilometer course. The plane must never exceed a height of 400 meters (1,312 feet) to prevent excessive speed from a steep dive. The plane must not be higher than 75 meters (264 feet) over the measured course or during the 500 meter (*Continued on page 81*)

SMOKE which came from XP-84's jet engine made plane easy to follow. This will be eliminated in other models

PILOT of the Thunderjet on her speed runs is Capt. M. L. Smith of Wright Field. He also has flown U.K.'s Meteor



NO STEP

MUSIC IN THE AIR

Met Opera star combines business with pleasure by making her concert tour through 18 states via own plane

By MONA PAULEE

As Told to Sally Mirliss

UNIQUE in the staid history of Metropolitan Opera is Mona Paulee, a girl who made her way up through vaudeville and the five-a-week and is still doing the unconventional—this season by concertizing via plane! Miss Paulee won her much-coveted Metropolitan contract via the Auditions of the Air in 1942. The following year she made her debut as Gianetta in Donizetti's "L'Elisir d'Amore" and within a few months was dubbed "the glamour girl of the Met." As a matter of fact, she recently was voted the Met's pin-up girl.—Ed.

"Concertize by air? Crazy?" That was the manager's reaction.

"Wanta spend a fortune?" That was the family's reaction.

"You'll kill yourself!" That was the Metropolitan's reaction.

We hadn't bargained for all the hullabaloo when we decided on the plane. It seemed like such a

simple way of combining business with pleasure. To be achingly honest: it all started because we thought it would be *fun* to fly from town to town, filling our scheduled concert dates.

My husband, Captain Dean Holt, on terminal leave from the Air Transport Command, barged into the living room one afternoon, the new concert schedule flaring from his hand. I must confess it was one of the heaviest listings I'd had to date, with some 44 concerts scheduled throughout the United States and Canada.

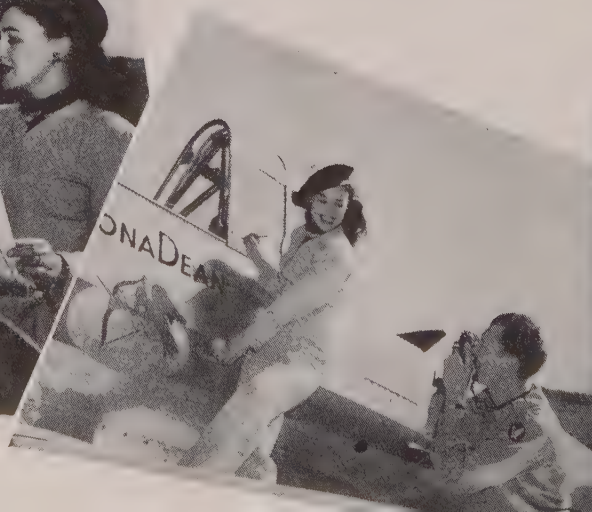
Dean always has been a hellion when it comes to traveling. I can remember when we first began working together out in San Francisco, Dean as band-leader in the night-club, and I as soloist. Dean consistently refused to take the band on tour because, as he put it, "those depressing toy trains aren't worth the effort." My own feeling is that Dean has never quite got used to urban ways. Born in tiny Wenatchee, Washington—a city, incidentally, which we'll visit on the tour—Dean remains sufficiently out-of-doors to insist on sport shirts and athletics, even in New York! So when the question of the tour came up, Dean immediately hit upon this wonderful way of saving time—with the idea in back of his mind, I'm sure, that now would be the chance to get in some extra hunting, fishing, swimming, or what-have-you.

Then, too, I think Dean actually considers his greatest sport is flying. (Continued on page 80)

PILOT-PIANIST Dean Holt pores over maps and computer with his wife, Mona Paulee. They're making concert tour in AT-6

PLANE-NAMING calls for a photograph of the process. Capt. Holt snaps the picture while his artist-wife adds last touch

REFUELING at intermediate stop is a task requiring four hands; Dean bears weight of fuel hose, while his wife handles nozzle





WAR-SURPLUS AT-6 carries Mona Paulee and husband on concert tours until they take delivery of long-awaited Rocket

LUGGAGE was a tight squeeze, but they managed to take all they'll need—evening gowns, tuxedos, swim suits, etc.

HIGH STEP on the AT-6 made wearing of slacks a necessity. When the new ship is delivered, street clothes will be the order

BACK-SEAT FLYING, by intercommunication, is expected by all husbands, so Capt. Holt shows his wife how the intercom works





VISIBILITY is side-by-side with seating comfort in Culver V. This all-wood low-wing monoplane has retractable gear of tricycle type and hydraulic two-position prop as standard equipment. Sea-level cruising is 121 mph at 75 per cent power—range is around 550 miles. Fuel capacity is 32 gallons stored in right and left wing tanks. Engine is 85-hp Continental



CULVER MODEL V

*Slated for cross-country favor this two-seater
is fastest light airplane in its power class*

By GENE LANDMAN

THE Culver Model V design belongs to Culver Aircraft Corp. of Wichita, Kansas, but the airplane itself belongs to the private pilot who wants a two-place air "scooter" that really scoots. Culver Aircraft Corp., as you undoubtedly know, is the company with the family tree that boasts a two-placer of repute on its prewar branches and, on the branches that grew during the war, the highly successful plywood jobs for the Army and Navy experimental work in radio-control aircraft.

Looking at this "lightplane tree" we arrive at the favorable conclusion that there's good stock in the heritage of Culver's present Model V . . . an airplane that has plenty of get-up-and-go in its appearance. This notwithstanding nor including the fact that it, like its forebears, is on the small side, being but a diminutive 6 feet 9½ inches tall on its tricycle gear, 20 feet 6 inches long and with a 29-foot wing span.

An all-wood plastic-bonded ship, the V has a full-cantilever wing with semi-monocoque fuselage. Of particular interest is the Culver's wing-tip dihedral. At the point where the right and left outer wing sections join the 20-foot cantilever wing, there exists 2°40' of dihedral. This decided dihedral of the wing tip is, for the most part, a production economy. However, it does accomplish other things too in that it gets the tips up and away from the ground where they aren't so apt to get banged up, and it offers a goodly amount of wash-out which gives the

V's pilot better aileron control at low airspeeds.

The wing itself runs clean through, and forms the underside of the fuselage—also the landing gear wheel wells when gear is retracted. On NC 80144 (the Model V which your reporter "test-hopped") the oil-air landing gear and nose wheel struts had a sturdy look about them and later their seven-inch stroke proved adequate to absorb my dropping us in from a good three to four feet.

Inspection of the plane's cockpit disclosed a handsome interior. Chief contributors to these good looks were the Lucite handles on the controls and switches, together with a gray trim; and the excellent instrument-panel arrangement that employs a BTO (big time operator's) center column such as is found on large multi-engine craft. This, too, makes accessible such items as the master switch, the starter switch, cabin air switches, the Simpli-Fly control and space for the radio receiver. The "jack box" for plugging in the radio's microphone and earphones is located behind the seats thus keeping the bothersome black, coiling wires away from a pilot's arm movements.

In flight it was discovered that there was more than meets the eye in the appeal of the V's cockpit arrangement—such items as gear actuator, propeller pitch control, trim control, radio tuning or light switches are all close by the throttle! The prop control can be pushed in (for low pitch) without taking your hand off the Lucite throttle handle. All this makes for easier operation.

While I wondered at first why Culver elected a stick control in lieu of the wheel, the full view of the panel accorded the pilot as well as the freedom



of movement from throttle to other flight controls gave me the answer . . . the wheel would be in the way. As to the stick control—have the Missus take note of this—it doesn't interfere with Madam's skirt. All of which gives the Culver an "A" when it comes to traveling clothes decorum.

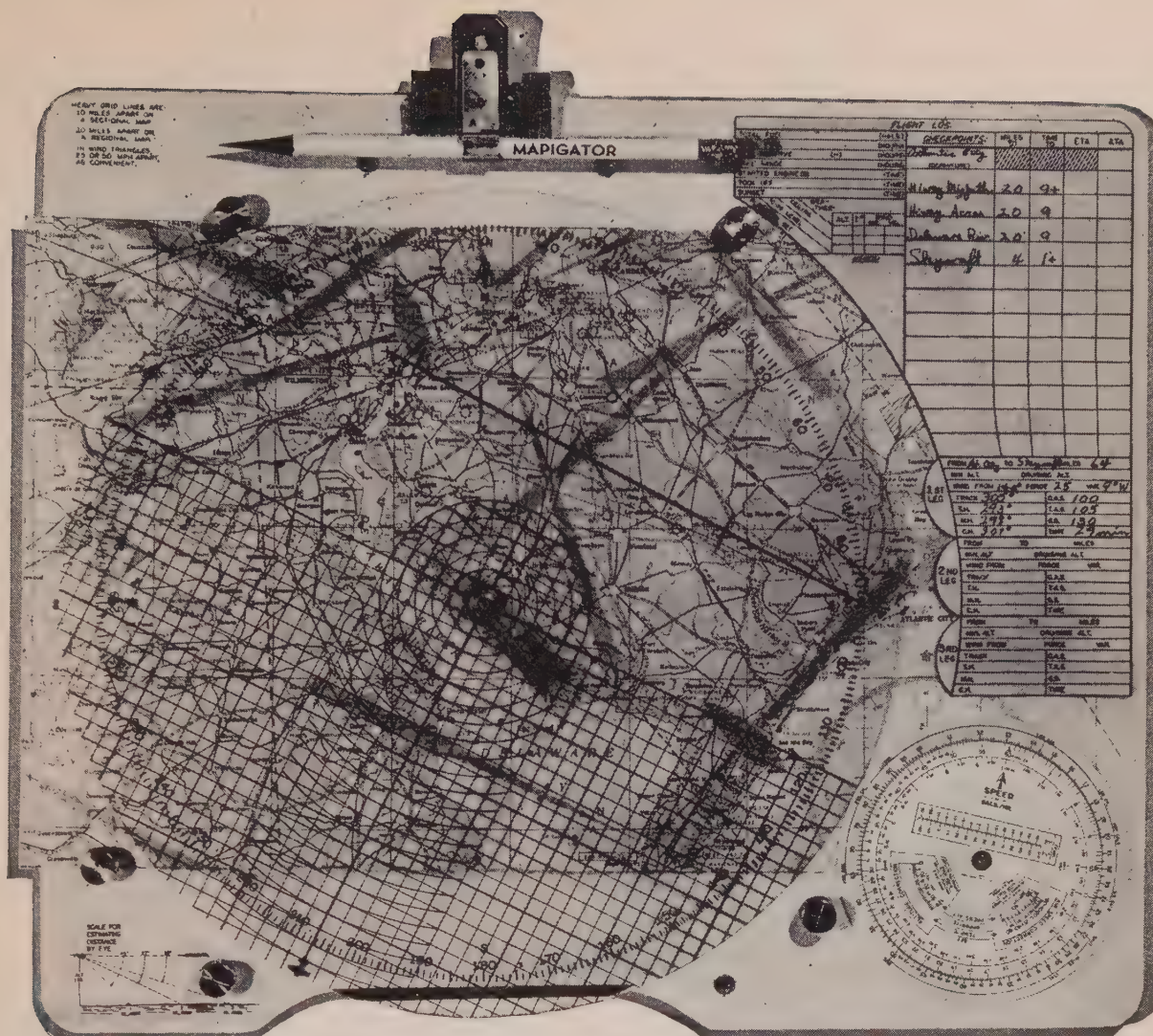
Being purely objective about the ease of getting into the ship, my report is it's satisfactory. The V's tail can be held down to lower the trailing edge of the wing for the feminine contingent traveling in street clothes. From either wing into the cockpit, and the entrance is identical for both seats, one becomes conscious of a bit of "finagling" to get in. But to say it's difficult is as wrong as to say it's easy.

Just a word about the canopy, or hatch. It opens on a hinge-line between the engine nacelle and the windshield. When the hatch is forward, it can be closed from a standing position only—once seated, one can no longer reach the inside hatch handle. Therefore, the trick is to close it before you start taxiing. This "open" hatch is the Culver's only source of cabin ventilation while the plane is on the ground. Therefore, the cabin, on a warm sunny day, is apt to get a bit stuffy while you're taxiing into take-off position. As soon as you take off, though, this stuffiness clears out via the air scoop atop the engine nacelle. It is an excellent cabin-air refresher, in flight. It outdoes any other type ventilation this writer has found in personal aircraft. It may contribute to the noise level in the V—which is not as low as one or two other new personal planes the writer has flown—but it's a worthwhile scoop, and this mostly because the V is not too noisy a ship.

The luggage space in the Culver is forward of the instrument panel. In closing the canopy, a shelf which is part of the canopy closes over the compartment. The shape of the compartment wouldn't hold a B-4 bag or a large piece of luggage although it will contain the equivalent in the correct shape. So, Culver has a set of travel bags especially designed to fit. A neat trick! Sixty pounds can be carried here. Ten pounds more can be inserted behind the cockpit seats. Safety-wise the baggage space between the engine and the cockpit means impact force can be absorbed in front of the cockpit. A good idea.

All summed up—the cockpit was designed not only for ease of operation and good looks, but also for comfort. The cabin seems roomy. The rudder pedals are a good distance from the seat which best illustrates this point. Bob Ferm, salesman for one of Culver's distributors who was with the writer, was seated on the right and even though he is 6 feet tall, his knees were not (*Continued on page 72*)

WING-TIP dihedral adds to low air-speed maneuvering. Cabin entrance is via nose-hatch (as above). Simpli-Fly Control use alters position of horizontal stabilizer, moves flaps. Cabin is compact, functional, attractive




MAPIGATOR... a patented sense of direction

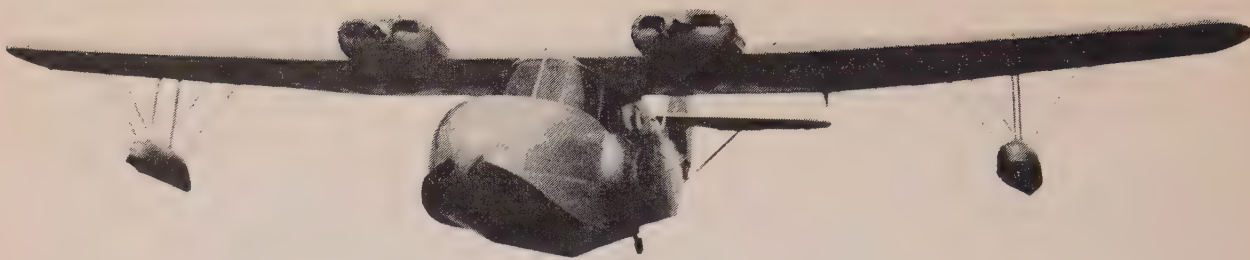
IF ANYONE has ever taken a picture of a cross-country pilot in action, it probably was displayed under the title, "Fumbling." And fumbling it was, what with Mr. Pilot flying the ship with one hand and using the other to grope around and find the bulky map, that elusive pencil, the disappearing computer and an unwieldy notepad. True, once assembled, all that equipment made it possible for the pilot to solve his estimated time of arrival at check points and compare it with the actual time of arrival, figure his fuel consumption, etc.

That's the picture that belongs to yesterday, though. Today there's hope for it all, hope in the form of the Mapigator, a new and unique navigational device, designed for the personal pilot, that combines in one unit the functions of plotters, dividers, protractors, memo pads, wind-vector computers and circular sliderules. In addition to all that,

the Mapigator holds the map, and even holds the pencil! Note plastic wind arrow under center screw.

Of extremely lightweight material, the lapboard Mapigator is 14 x 16 x 7/8 inches. A transparent coversheet, attached by thumbscrews and surfaced for pencil, bears a compass rose and white-backed Flight Log. The time-speed-fuel-distance computer is secured beneath the Log. A separate movable disc is marked off in grids inside the compass rose for measuring course line and distance and for setting up wind-vector computations. The aeronautical chart is inserted from any one of three sides, and is always aligned with North-South on the compass rose according to the Meridians on the S.A.C. Resting conveniently on the pilot's lap, the Mapigator may be operated with one hand.

Due to show up on aviation supply counters soon, the versatile Mapigator will sell for \$17.95. 



Operations MAIN STREET



MILWAUKEE'S airbase, for seaplanes and landplanes, is located just two short blocks from the business district

Businessmen and lady shoppers make good use of Milwaukee's "right downtown" seaplane base, landing strip

IT SEEMS strange, and somewhat alarming, that in these vast United States, which boast of more than 60,000 square miles of inland waters, there exists only a small smattering of designated seaplane bases for the private flyer. This number, which by





BUSINESSMEN and shoppers who are plane owners now commute by plane between home and downtown. Lange Aviation Corp. caters to boat owners as well

the latest (though incomplete) CAA census totaled 65, (SKYWAY'S recent survey showed about 150 seaplane bases in operation as of July, 1946) are scattered so haphazardly across the country that they by no means comprise an efficient network of landing and service stations for seaplane owners.

And not to be overlooked in this sad tale of neglect are those thousands of landplane owners who have gone to considerable expense to equip their craft with floats, with the fond hope of enjoying frequent vacations on or near the country's many lakes and rivers. Having to remove the floats every time they need a tankful of gas, which is the case far too frequently, is sufficiently discouraging to make the most ardent flyer long for a horse.

Why, you might well ask, do such pitiful conditions exist? The answer could easily be that as yet not enough men feel that operating a seaplane base would prove to be a very prosperous means of earning a livelihood. If that's the case, those doubters should take a look at the Lange Aviation Corp. located on the Maitland Air Strip in Milwaukee, Wis.

Anthony Lange, operator and principal owner of the Corporation, is a heavy-set, purposeful-looking man who gives every appearance of knowing a good business enterprise when he sees one. Back in the early 1930's, when people who made a career of aviation were still looked upon as being slightly weak in the head, Tony Lange was convinced that Milwaukee, sitting as it did right on Lake Michigan, should have a small seaplane base. He picked out his spot, and the site he selected no doubt caused those who knew his inten- (Continued on page 84)



By M. LEFEVRE SMITH

PUDDLEJUMPERS Are

By DON DOWNIE

DO YOU fly a puddle jumper and gaze enviously at the airliners and bombers that pass you like Barney Oldfield leaving the one hoss shay? Don't shed a tear over those streamlined moving vans. You can have more fun in that puddle-jumper in an hour than the pilot of a big plane can have in a month.

Don't get me wrong. This isn't the "sour grapes" griping of a pilot who couldn't make the grade. The big babies are fun to fly, sure. I've flown some myself, including a session in C-46's over the Burma Hump. But for downright fun in flying, I'll take a puddlejumper every time.

First, who can land a 25- or 50-ton transport on a deserted country lane, cow pasture, or bean field adjoining a favored fishing stream? In a puddle-jumper, it's a cinch. You can go almost anywhere

LIGHTPLANE flying is more fun than pushing around such streamlined trucks as this C-46 (shown below taking off from field in China). Another point in a PT or Cub's favor is the fact that it can be landed on a highway and then be taxied right up to a gas station



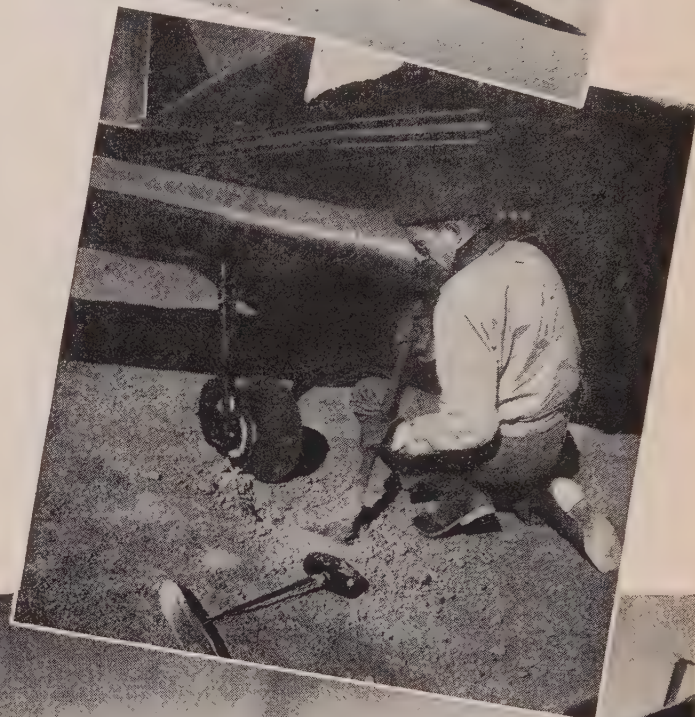
More Fun

you wish in a little plane, and once you get there you can usually find a place to land safely without walking miles into town from a super airdrome.

All right, so it takes a little longer in a puddle-jumper. So what? Who can afford to pay the gas bills on 2,000- or 4,000-hp engines? If you can get an honest 100 mph out of the old clunker, isn't that about enough? It beats driving if you haven't got a 30-mph headwind.

You've got to know just as much about this flying game to do a *good* job in a *Cub* or a PT as you do to handle a DC-4. Until you've flown a big airplane, it is hard to believe, but a pilot is just a pilot regardless of his airplane, just as a chauffeur is a driver whether he is behind the wheel of a light pick-up or a 15-ton semi-truck and trailer. The whole secret of flying a big airplane is procedure. There is a check list, often with over 100 items on it, that the pilot goes through before he can take off. Any pilot with a little training and a lot of patience, can go (*Continued on page 78*)

PERSONAL PLANE landing fields can't always be a friend's front yard, but if the friend's home is in the desert it's not only possible, it's probable. You can tie the ship down at the front steps. Too, it's fun to realize your plane doesn't eat up 75 gallons per hour



Trail-Driver to Cloud-Rider

By J. M. RABER

In 1884 Starr Nelson drove cattle over western ranges. Today, at 80, he chalks up 6th year as a pilot



CAP PILOT during the war, Starr Nelson flew missions throughout southwestern U. S. He used a Luscombe

BY the gods! I really felt that I was in God's pocket when I hit the flat country." Starr Nelson's chuckle was amusedly reminiscent of his first long cross-country, mountain-topping flight. He spoke from a plenitude of four-score jam-packed years; years that have carried him from the back of a trail-herding bronco through the cab of a snorting, crag-climbing locomotive, to the controls of a Luscombe 8A Continental 65. That exciting cross-mountain trip, accomplished when he was 77 years old, enkindled him to greater reaches along the skyways, and so it happened that as a robust wind was busily sweeping a Denver airport on a wintry morning in January, 1946, a two-passenger airplane settled with the grace and precision of an inland sea-gull.

A stir of admiring interest passed among the field attendants as a white-haired man, standing tall and straight, climbed out of the pilot's seat and walked toward them. The boys instantly recognized him as 80-year old Starr Nelson, one of the oldest licensed pilots in the world and a flyer who had not obtained his pilot's license until he was past 74.

It was not the first time Starr had dropped from the sky on the eastern side of the 14,400-foot plus Continental Divide from his home on the Western Slope. Howling winter winds had tangled in the Divide that day and the field-men crowded closely with the question, "How was the going?"

"The down-winds were about as bad as I ever experienced," he responded (*Continued on page 66*)

FLYING THE ROCKIES, with his grandson (below) in the *Cruiser*, Nelson learned about mountain winds





RANCHER NOW, former locomotive engineer Nelson has an airport, complete with hangar (above) on his property. Newest addition is a recently purchased Ercoupe (below), which Mr. Nelson will use to traverse southwestern United States on his many aerial business trips and pleasure jaunts



CHECK THAT COMPASS

***For that "certain" feeling pilots
need an accurate magnetic compass***

THERE'S no doubt about it, the magnetic compass is the Number 1 leading light in a navigator's life, even the navigator with a bird-dog sense. And when the personal-plane pilot takes up navigating, it doesn't take him long to realize the importance of that particular instrument, particularly if he sets out to do a bit of real cross-country flying—from one section of the country to another, not just county to county. Hangar sessions the country over consistently emphasize the fact that the compass is one of the most reliable instruments in the cockpit. You can be certain, too, that in just about every case where a sad-faced pilot reports he got lost because "my com-

**CONVENIENT for checking mag compass headings is
use of compass rose (below) or marked runways (right)**





PLANE can be lined up with master compass to check mag headings (above) or pilot can fly toward road of True N-S or E-W bearings with the wings parallel

pass was wrong," it wasn't the mag compass that was off the beam, it was Mister Pilot himself.

The compass, like the plane itself and the engine, requires care and consideration. There are many things that can and do throw a compass off. Among them are vibration and pivot friction, rotation of the aircraft about its vertical axis (more commonly known as "turning error"), the magnetism in soft iron induced by the earth's magnetic field, and, lastly, residual magnetic fields of the steel parts of the plane. It is this last that we are mainly concerned with here.

Newly added equipment in a cockpit, repair of certain metallic parts, alterations and repair to the plane's electrical system . . . these and similar things can and often do keep a compass from behaving properly. Just as a man who owns the most reliable watch in the county will check that watch occasionally against a known time, so the pilot should check his compass for accuracy. After such a check, the pilot has a navigational mainstay in his magnetic compass that can't be beat for cross-country flying.

To understand the need for checking a compass, let's have a look at it from the pilot's point of view. The mag compass on the instrument panel (or atop it, a more favorable location because it is more free of effects from the plane's equipment) is a card-type compass, the lubber line of which always designates the position of the plane in relation to magnetic north. For example, if you are flying a course which causes the compass card to read 3 opposite the lubber line, you are flying a position 30 degrees off Magnetic North. The cardinal points of the (Continued on page 88)



FARM sections of True compass bearings form a ground pattern (right) by which pilot can check his compass



CUB FLYAWAY

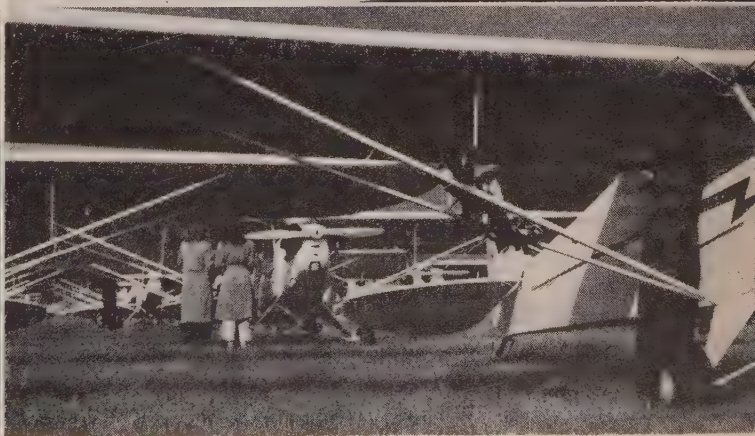
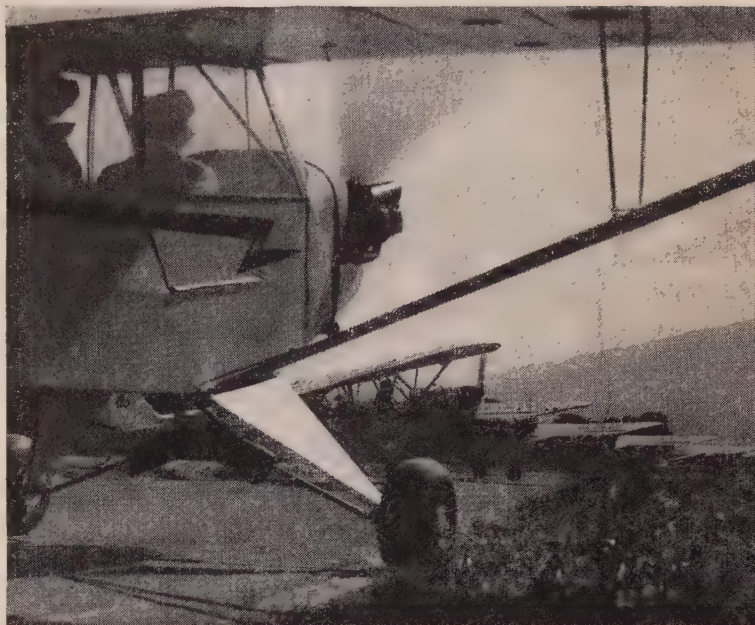
FROM the four corners of the compass recently came former members of the WASP's to Lock Haven (Pa.) to make the largest mass formation delivery in the annals of personal-plane ferrying. Piper Aircraft was host to the idea and host to the girls for a few days of reunion. Upon completion of the reunion business, over 90 pilots for 90 *Cubs* reported to flight line—Cub Haven—for pre-take-off briefing. Pictures here give you some idea of the fun that was business, too.

The girls were briefed by squadrons just prior to their take-off for Akron, Ohio, destination number one of the entire group that day. After group briefing came the usual poring over aero charts. Then came the preflighting of the planes. One girl was caught by the camera testing a prop while another prideful pilot was shining her plane with a reverence suitable for a P-80.

At take-off time, the lead pilot was flagged off, then followed into the sky by her two wing planes. Even though a sharp crosswind blew across the runway, the girls got off with a precision that left Piper personnel convinced their planes were in safe hands. (On entire trip no plane was damaged.)

Over the rough Pennsylvania hills and under an overcast, the tiny planes flew wing to wing. The entire mass flight of 90 planes landed at Akron, Ohio, in just 27 minutes in mid afternoon. They parked their planes in compact rows, gathered in groups to discuss the first formation flying some of the girls had done, and to swap experiences with those to whom formation flying was "old hat" stuff.

After a feast at Akron and refueling of the planes, the gals took off again. This take-off was not for formation flying, but single file, each in a different direction, en route to the delivery point of the *Cub* entrusted to the individual ferry pilot. ✈





DILBERT



By S. H. Warner and Robert C. Osborn

AFTER YOU MY DEAR ALPHONSO—Emily Post doesn't establish the rules of flying etiquette, nor will you find them set forth in any book—as yet. This doesn't mean, however, that there is no such thing as courtesy of the air; that anything goes. Definitely not! These unwritten laws are far more rigid than those which govern your actions in the dining room or parlor. What is more, in aviation there is never any controversy over correct procedure, for a *faux pas* here entails an element of danger, to personnel and property.

Since aviation etiquette mainly is based on safety, any aviator with sense—common sense and a sense of decency—easily can figure out exactly what to do in any case. For instance, before you rev up on the ground, common sense should make you insure that your propeller blast will not damage other planes astern, either parked or taxiing. And don't forget the innocent bystander. Here's where your sense of decency comes in. Besides, he won't admire you if he can't see you for dust.

In the air, you don't cut in and land ahead of the other guy just because you have a faster ship. Safety dictates this one, safety for both of you.

Likewise, you don't fly even near to any other aircraft and you don't fly low over populated areas. There are strict CAA regs on these last two points and I promise you there will be more and stricter ones if the rapidly increasing

number of flyers fail to take their responsibilities in these matters seriously.

To digress a moment, the following figures demonstrate how rapidly private flying really is expanding: Through 1941 there were 100,000 CAA certified pilots as against 335,000 in June 1946; some 22,000 surplus aircraft were recently sold for civil use, as many as the total number in use in 1942; shipment

of new civilian aircraft in May 1946 was 3,073 of which 95 percent were small, two-place, single-engine jobs, more than the entire production for civil use in 1938. CAA predicts 400,000 private planes by 1955. There's your modern handwriting on the wall, boys. Interpretation is simple—you've got to fly sensibly. If you don't do it on the present voluntary basis, you will get smothered under such a heavy burden of legislation and regulations as to take most of the fun out of the game, be it business or pleasure.

It isn't even enough that you fly so that the lives of pedestrians or other aviators will not be endangered. You must scrupulously avoid giving anyone justifiable cause to worry on this score.

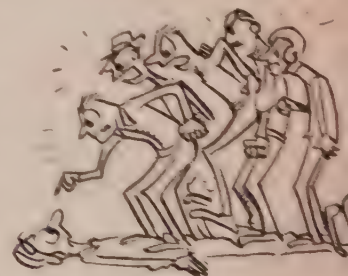
Which brings up the subject of local airports, a very delicate question in many communities. So delicate, in fact, that some cities strenuously oppose the establishment of local flying fields while others seek to force those already established to move so far out in the country that they become almost inaccessible.

Unfortunately, as cities expand and local flying increases, the solution of this problem won't become any easier. The advent of the silent propeller will do much to eliminate the noise which annoys 'em, but in the meantime, it is vitally important that all aviators, both individually and collectively, refrain from making themselves obnoxious to local inhabitants. Particularly keep this in mind during low alti-

tude flying in connection with take-offs and landings. I said "individually and collectively" because this is another place where Dilbert, in a few thoughtless moments, can wreck the character and reputation which the rest of you so conscientiously have built up. The only way I see of protecting yourselves is to band together and see that flagrant violators are properly penalized. (Continued on page 78)



Law catches the buzzers

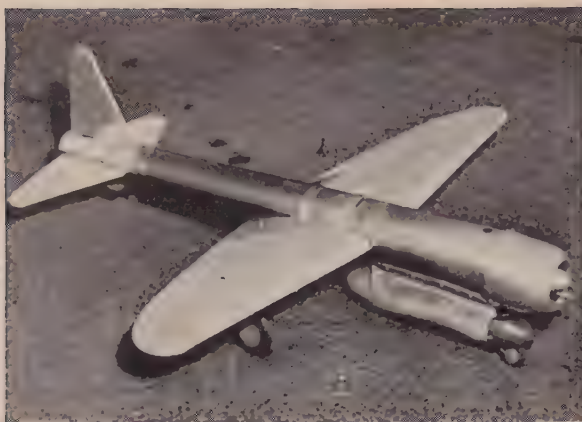


One buzz boy ruins it for all

Look, son, I
haven't
lost a
fight
yet.!



Look out, Dilbert . . . beware of that prop!



MAJOR, a model jet plane powered by a Minijet delivering $2\frac{1}{2}$ pounds of thrust, has speed of 110 mph

JET UNIT is fitted into a 29-inch shroud made of stainless steel. Unit's fuel is carried in tank under shroud



MODEL MEET in California attracted great crowds. Most were interested in jet models built by Gene Smith



JET POWERS MODEL PLANES

By Peyton Carroll

HARDLY does Lloyd's of London decide that the P-80 is a fair insurance risk than some model-plane enthusiast has a prototype roaring around in circular flight on the end of a wire. The model airplane builders are an amazing tribe—not only do they keep pace with the giant strides of industrial design, but often they step out in front with radical and significant changes.

The secrecy of jet-engine design should have made the modeler's steps falter, but it didn't work out that way. The war was hardly over before a miniature jet engine was available for model designs. The significance of the engine lies in its being a pulse-jet. The manufacturer rejected the type of jet engine currently in use for all full-scale planes and selected a type of jet propulsion where the future potentialities have scarcely been touched. The pulse-jet manufactured in California under the trade name of Minijet, is a typical example of the power unit used by the Germans in the dreaded V-1 buzz bomb attacks.

The engine develops $2\frac{1}{2}$ pounds of thrust for its weight of approximately 1 pound and operates on white unleaded gasoline. It has a low frontal area of 2 inches and a length of about 28 inches.

Installed in a model airplane the engine is started with an ordinary tire pump and a spark supplied from a coil and battery. Once the engine operation commences the starting paraphernalia is accessory equipment and is left on the ground during the model flight. Gene Smith, of North Hollywood, California, tall lanky engineer from the Lockheed Model Department, has built and flown a number of jet-propelled models.

One of the most interesting of his designs is the *MAJOR*—an orthodox, from a modeler's point of view, speed job of simple, all-metal construction. Smith has flight-tested it for over two months.

"The *Major* can be a guaranteed 100-mph crate," Smith said. "Actually when the motor is delivering full thrust she creeps up to about 115 mph on the last quarter mile of the test flight." Gene Smith smiled and added: "Any kid with a vise, a soldering iron, a few taps and drills can build one."

Here's how *he* built it.

Roll a stainless steel shroud of .040 thickness allowing $\frac{1}{2}$ inch clearance at the nose and $\frac{3}{8}$ inch clearance at the tail. The shroud should be about

29 inches long. Use the small type P-K screws along the seam to hold the shroud in its funnel shape.

The engine has four studs projecting from the head, or venturi, and four L-shaped supports are attached to the engine at the studs. The engine is slid, tail first, into the shroud until the flat part of the L supports abut against the inside of the shroud. The shroud and L are tapped, drilled and secured in place by screws. The tail pipe is centered by three equally placed screws—no other support is necessary. A cowlings is added for appearance.

The wings and tail surfaces are rolled from .012 aluminum sheet which has enough rigidity to do away with spars except for a support halfway out the wing to absorb the landing gear shock. The wings and empennage are attached to bands that can be adjusted along the length of the shroud for best flying characteristics.

The gas tank is securely fastened to the shroud as near the operating head as possible. Shorter gas lines improve performance of jet models under the strain of centrifugal force due to high-speed flight. One of the gas lines is the gas feed line, the other line is the tank pressurization line which aids an even fuel by maintaining pressure in the tank.

A view from the top shows the high-tension wire opening to allow the operator to connect the coil to the spark plug. A spark plug is built into the combustion chamber to provide the initial spark.

The ship employs the Walker U-control steering device. The plane is balanced to fly around its circular path without nosing in but some type of control is necessary for up and down motion. The control wires from the operator's U-shaped handle enter the wing tip and operate a cross bar fastened in the root of the wing. Motion is transferred to the elevators by a single wire arrangement.

The little plane is about 30 inches long and has a wing span of 30 inches. Gene said: "It's not a good idea to cut down on wing area with jet propulsion because a jet model needs such a long take-off run. Power is built up very slowly."

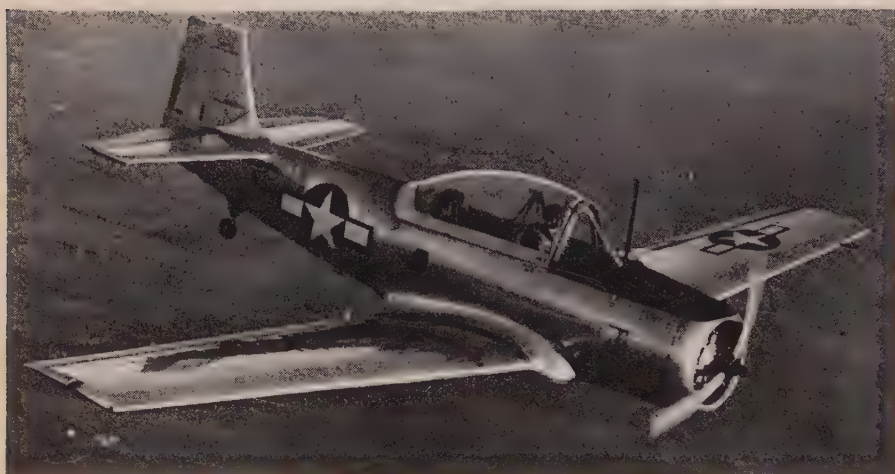
The weight of the plane, which has very little to do with the plane's speed, is approximately $3\frac{1}{2}$ pounds. For high speeds, Smith revealed that it was far more important to cut down on frontal area.

"There are certain limiting factors concerning speed such as the drag of the control wires, frontal drag, short duration flights since gas tanks have to be so large, but flying one of these iron-tongued titans is one of the greatest thrills I've ever known."

OK, Gene, you talked us into it!



NEW... on the wing



FAIRCHILD XNQ Said to be the fastest primary trainer ever built, the new XNQ has speed of 170 mph, stalls at 53 mph and climbs at 1,000 fpm. It is a low-wing all-metal, two-place ship that is powered by 320-hp Lycoming engine. It is equipped with flaps, has electrically operated retractable landing gear. The cockpit is enclosed by an unobstructed one-piece bubble canopy that assures all-around visibility. XNQ was primarily built for use by the Navy.

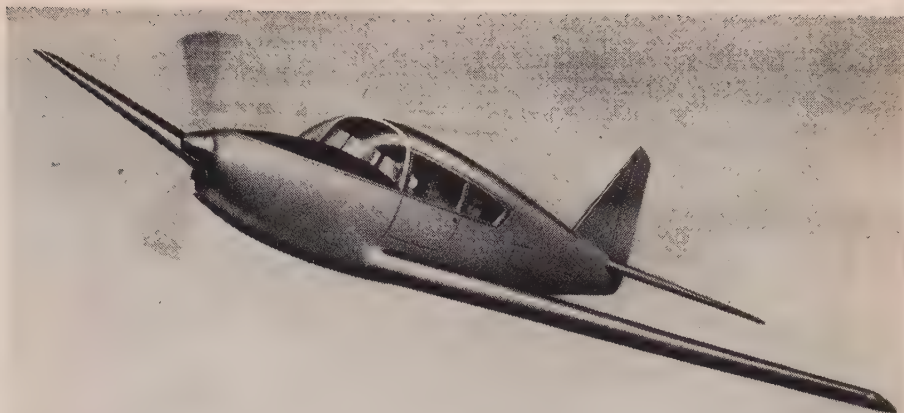
WEATHERLY-CAMPBELL COLT

This new four-place all-metal plane was designed by Don Luscombe and Fred Knack. Basic performance data indicate the cruising speed to be 140 mph at 8,000 feet, the top speed 160 mph, with a minimum range of 750 miles. The ship is powered by 190-hp Lycoming engine, with 185-hp Continental as optional. The landing speed is said to be 52 mph. Now being flight tested, will be in production soon. Made by Weatherly-Campbell.



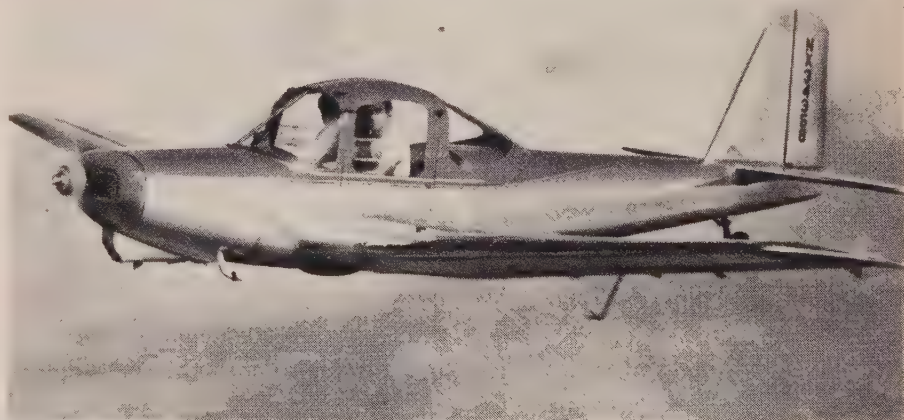
PLANE-MOBILE in roadable-plane field, a new design has been submitted by Daniel R. Zuck, an aviation engineer of long standing, and Mr. Stanley D. Whitaker. This model is a two-place plane that is at present undergoing extensive road and flight tests. As the picture indicates the *Plane-Mobile* is a pusher type, has tricycle gear which is retractable in flight, and folding wings. A newer and much improved version is being developed and tested.

FAIRCHILD F-47 Here is an artist's drawing of the long-awaited new Fairchild personal plane. It is a four-place ship that features the cabin comfort so long associated with big cars. It has a tricycle retractable landing gear and all-around cabin visibility. The rear seat of this new Fairchild is wide enough for three but actually will seat four in absolute comfort. It is expected to be in production and on the personal plane market within a very short time.



BENDIX MODEL K The experimental helicopter which has made hundreds of tests during the past year with a skeleton chassis, recently made its first trip aloft with its new all-metal fuselage. The helicopter is powered by 85-hp Continental engine. As yet no speed trials have been made nor have altitude tests been made, although several flights at more than 200 feet have been satisfactorily tried. Six larger models, four-placers, are being tested.

MEYERS MAC 125-C Another all-metal two-placer is the two-wing monoplane built by Meyers Aircraft. Powered by 125-hp Continental engine, the plane has a cruising speed of 120 mph, landing speed with flaps of 45 mph, a maximum range of 500 miles. Standard equipment includes starter, hydraulic brakes, parking brake, cabin heater and exhaust silencer. The cabin is entered through two automobile-type doors and is sound-proof and well upholstered.



CHRISLEA ACE England's newest personal plane is this four-place, high-wing, tricycle gear Ace. It incorporates a new and different control hook-up—the control column protrudes from instrument panel, has no rudder pedals and yet the rudder is not linked with the ailerons as in the *Ercoupe*. To climb the entire column is lifted upwards, to lower the nose, the entire column is pushed down. The Ace is powered by 75-hp Monaco, is on sale for \$2,400.

WINGS IN A DAY

By **BILL SMITH**

Occasionally you hear a story of some genius, with a natural flying ability, climbing into a lightplane, fiddling with the controls, and after listening to a few minutes' conversation about "how it's done," taking off. Here is the story of a man, who after many hours of "riding time," decided to learn to fly in a single day. This procedure is not recommended to the general aviation enthusiast.—Ed.

WHEN a man who has flown several hundred hours for the U. S. Navy as an aerial photographer returns to civilian life, takes up his trade as a news photographer, continuing flying as a picture-making passenger, comes home to find his better half has sneaked out and obtained a flying license without his knowledge, it's time something was done about such a state of affairs.

Red Moores, *Brownsville Herald* news photographer, had it happen to him and here is what he did about it.

Red, who doubles in brass as a reporter for the *Herald* at the Rio Grande International Airport, met D. W. Simpson, aircraft dealer of Brownsville, Texas, and Velma "Skipper" Saunders, Simpson and Company pilot, over a cup of coffee at the airport cafe.

Moores told them his tale of woe—that his wife, Marion Smith Moores, former WAVE, had slipped out to a local private airfield, and had been flying daily for the past month.

Simpson, with a wink at "Skipper," told Moores he had just received three of the latest model Funk two-placers, one of which was to be used as a dem-

onstrator, and suggested that Red use the plane to catch up with his Missus.

"Sure," Skipper broke in. "I'll teach you."

"Yeah, but I'd have to do it all in one day to catch up with 'er!" the big red-head moaned.

"We can do it in one day if we get the weather."

"Okay, how about tomorrow?" Moores asked.

"Suits me. Let's check the weather."

The pair took off in search of a weather prognosticator. They found W. E. Green, local forecaster, who reported they would have perfect flying weather, and said he was positive enough that he would "eat one just like it if it was not."

After obtaining a doctor's certificate, Moores went to CAA Inspector Les Hables who issued him a student's permit, and the newshawk was ready to sprout wings.

Big Red's initial day's log reads like this:

Off at 7:15 a.m. 55 minutes. Down. Coffee.

Off " 8:25 95 minutes. Down. Coffee.

Off " 11:30 45 minutes. Down. Lunch.

Off " 1:15 pm. 50 minutes. Down. Coffee.

Off " 2:30 40 minutes. Down. Coffee.

Off " 3:30 30 minutes. Down. No coffee!

"Full!"

Off—Solo! 4:30 5 minutes. Down. Nearly out!

Both instructor and student finally hit the ground in an exhausted physical condition, and while it probably has been accomplished several times before, neither of them recommend future birdmen attempting to obtain wings in a single day. ✈✈



DAY BEGINS with Red Moores getting his student permit from CAA's Les Hables at the Rio Grande Airport



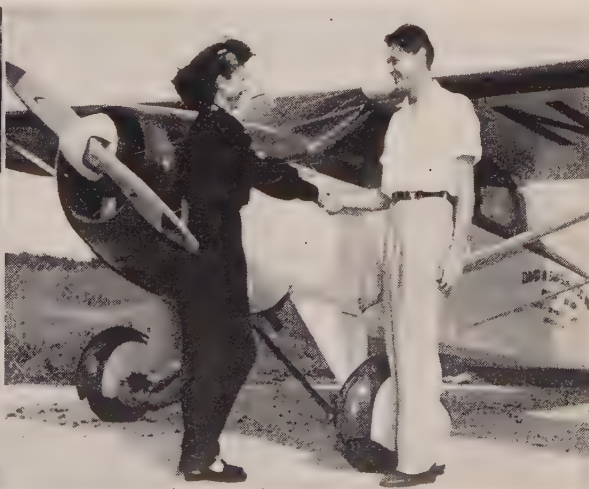
FIRST LESSON, at 7:15 a.m., was learning cockpit procedure. His instructor is former WASP Velma Saunders



SO THERE, says Red to his astonished wife as he proudly displays his 5 minutes of solo time



BETWEEN HOPS, and only a few minutes separated each, Red and his instructor consumed lots of coffee



SOLO AT LAST, and Red is congratulated by his instructor. He soloed afternoon of day instruction began



CLEARING OFFICE—At 2 a.m., clerks' work gets under way in sorting dept. of Los Angeles Bank of America

BANKING BY AIR

By **FRANK B. HOWE**

Little slips of paper worth fantastic sums go by air from California to their New York clearing houses

THE world's largest bank probably got that way, in great measure, because its management was not averse to stringing along with the march of progress. Unlike many financial institutions, hidebound by tradition and precedent, it has the reputation of being willing to examine new things and to adopt those which it finds good.

California's Bank of America or, to be more exact, California's 496 Banks of America, for the institution has that number of branches all within the single state, now has joined up with aviation in a project which opens a vast new field. Of equal importance to the air transport business and to the realm of finance is this innovation which recently

has been thoroughly tested and pronounced good.

To understand wholesale banking by air, as pioneered by the Bank of America in cooperation with American Airlines and already adopted by several other banking institutions, it would be well to look briefly behind the banking scenes.

The Bank of America has 3,500,000 depositors. These people daily receive checks drawn on other banks and deposit them in almost fantastic numbers. In the bank's Los Angeles "central clearing office," which assembles the checks deposited in or cashed by 128 of the branches, more than 1,000,000 checks have been handled in a single day. The average is 19,000,000 a month.

The amount of money involved in the handling of these checks drawn on "foreign" banks is staggering. And this float money, as bankers term it, represents as much as 1 per cent in interest to the bank. Naturally, therefore, it wants to get the checks it has received to the banks on which they are

drawn just as soon as possible; so the float money can be recovered and put to profitable use.

What's more, the number of eastern checks being handled in California is increasing rapidly. This is due to a heavy population influx, the establishment of west coast operations by eastern industrialists, and other factors. Checks on New York banks handled by Bank of America branches in the Los Angeles clearing area alone amount to nearly \$2,000,000 a day. That's a lot of float money.

Now we can get back to aviation.

When commercial air freight came into existence, following the end of the war, an idea occurred to Tom Woodward of American Airlines' cargo division, who knew something of the banker's problem. So he went to see the Bank of America.

"Look," said Woodward, "why don't we work out a way to air-freight your New York checks from Los Angeles to the New York clearing house every day? They'd go through *(Continued on page 74)*



CHECKS on New York banks, handled by the Bank of America branches in L.A. area, total almost \$2,000,000 per day. These are put aboard an airliner flown to N. Y.





HEAVY FOG and atmospheric haze can be reproduced for high-altitude training flights in Consolidated Vultee's Altichamber

FLYING UPSTAIRS

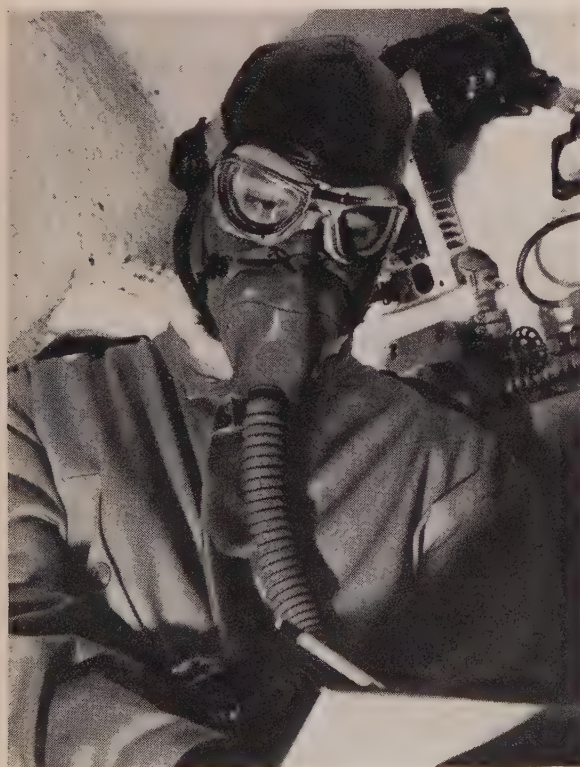
By **DR. H. F. HELMHOLZ, JR.**

Chief Physiologist, Convair

Special oxygen supply is a must in flight above the 15,000-foot level



CREW FOR high-altitude training flight enters this four-engine bomber through the bomb-bay. Pilot (below) records sensations as he sits in high-altitude test room



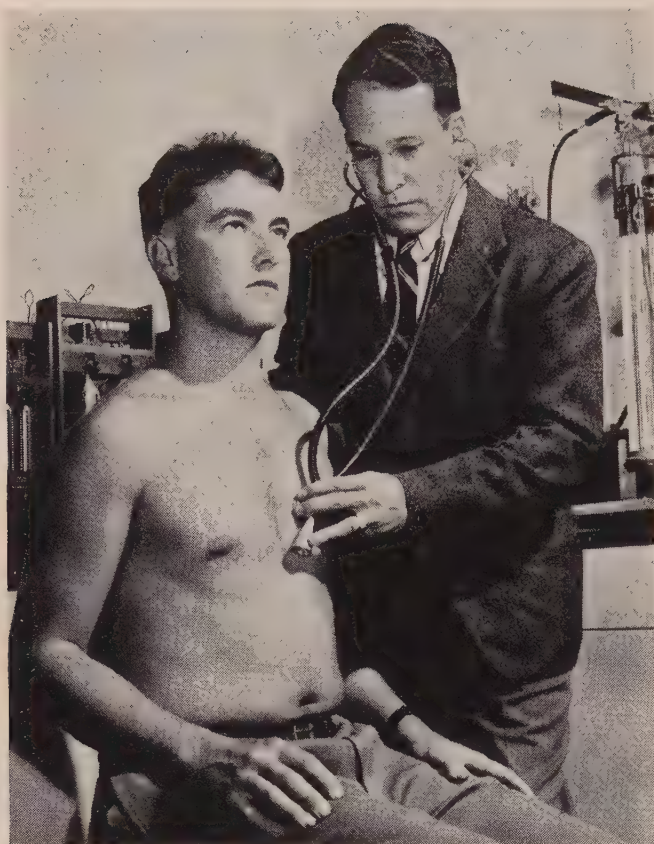
MAN'S evolution took place at or near sea level and he is not inherently equipped to stray off the earth's surface into the rarefied regions of the troposphere, a region extending to about 50,000 feet. Without mechanical equipment, he would need a spare lung or two and a muscular chamber to compress air for his use in the same manner as a supercharger compresses it for an airplane engine.

Additional air pressure, therefore, at high altitudes is the breath of life for aviation as we have known it until recently, both for the power plant and the human element. Oxygen is as important to the crew at high altitude as the supercharger is to the engine which takes them aloft. This is true of the new power plants, turbojets, propjets, pulse jets and ramjets but not of rocket engines. As anti-aircraft defenses have driven bombers to higher and higher altitudes during the war, development of oxygen equipment and studies into physiological aspects of oxygen use have received considerable attention. Because the aircraft manufactured by Consolidated Vultee Aircraft Corporation are designed to function at extreme altitudes, the Company has set up a completely equipped High Altitude Laboratory for research into these problems.

As a pilot flies to greater altitudes, the atmospheric pressure decreases and the amount of oxygen in the atmosphere decreases correspondingly. Between 10,000 and 20,000 feet the scanty amount of oxygen finally will no longer support either life or the rapid combustion required by an internal combustion engine. Air contains only 21 per cent oxygen. At sea level, therefore, in accordance with Dalton's *Law of Partial Pressures* the actual oxygen pressure is only about one-fifth of the total pressure.

CREW MEMBER carefully tests his oxygen connection before high-altitude plane takes off for its trip aloft





FLIGHT SURGEON gives each flyer a thorough examination before he takes part in a high-altitude flight test. His heart, lungs, blood pressure, ear-drums, vision, muscular reflexes, alertness, etc. are tested



It is this actual pressure of oxygen which forces it into solution in the blood. The availability of oxygen to the human organism is determined by its partial pressure.

When a man breathes air into his lungs it is moistened with water vapor and also is mixed with carbon dioxide, waste product of combustion which he is getting rid of or "blowing off." These additional gases exert partial pressures and at sea level where atmospheric pressure is 14.7 pounds per square inch, the partial pressure of oxygen will be even less than one-fifth, or about 2.13 psi.

As one ascends, this partial pressure then decreases and above 10,000 feet it will become so low that the blood cannot carry sufficient oxygen to parts of the body to keep it functioning properly. However, more of the atmospheric pressure can be used as oxygen pressure by replacing with oxygen the inert gases in the air, such as nitrogen and traces of rarer gases. This is the function of oxygen equipment. By its proper use a pilot will keep alert, a navigator capable and a passenger comfortable as high as 40,000 feet.

Energy which causes the brain and moving parts of a human machine to function is derived entirely from the burning or combustion of food by the oxygen carried by the blood stream from the lungs to every cell of the body. The oxygen, furthermore, must be delivered to these cells at a certain pressure. If the pressure is too low, insufficient numbers of oxygen molecules, in effect, get into the blood through the lungs, and those which are taken up by the blood are unable to support combustion in the tissues. This is known as oxygen deficiency.

The human body obtains (*Continued on page 76*)

TECHNICIANS test special equipment (*left*) in simulated high-altitude flight in Convair's Alti-chamber. Oxygen mask is adjusted (*right*) for each pilot





Airfoam

Super Luxury and Pilot Comfort

Easiest way to secure luxurious comfort in small personal planes—surest way to banish pilot fatigue and cramp on long hops—is to install deep-cushioned AIRFOAM seats. This Goodyear wonder cushioning is being used in both seats and mattresses on the newest super-airliners like the Douglas DC-6 because it provides luxurious restfulness, longer cushion life, and

reduced weight when seating is designed to use it. AIRFOAM never sags down or lumps up. Millions of foam-like air cells give it a permanent buoyancy that absorbs vibration and rough-weather bounce. Ask your airport supply dealer about AIRFOAM, or write: Goodyear, Aviation Products Division, Akron 16, Ohio or Los Angeles 54, California.



Navy BuAer

(Continued from page 21)

based in the open sea off Saipan and the Palaus by D-Day, and were running long-range search missions weeks before suitable fields were available for the operation of heavy land planes.

Fundamentally different as are the environments of sea-based and shore-based aviation, and the aircraft which those environments require, there are many points of contact in Naval and AAF development programs, which actually work for the mutual advantage of both services.

The air-cooled radial engine, the Norden bombsight, and the first successful American development of radio-controlled flight are among the important technical developments which Naval programs have produced. The liquid-cooled engine and the helicopter, on the other hand, are included among primarily AAF supported developments. All of the developments sponsored by either service are, of course, fully available to both.

The close-knit coordination of the strong research and development programs of the AAF and the Bureau of Aeronautics is sometimes a matter of surprise to individuals who are unaware of the long-standing and extensive organization which has been established for the purpose. This is the Aeronautical Board, established by order of the President, which is headed by Lieutenant General Eaker for the Army and Vice Admiral Radford for the Navy. It is the successor of the Joint Aircraft-Committee which established an outstanding record for inter-service coordination during the war. Under

its authority there is a Research and Development Committee, with a complete organization of sub-committees, which bring together in joint discussion and planning the technical experts and administrative officers of both services who are concerned with every phase of the research and development program. In this way budgets and plans are coordinated and unnecessary duplication and the waste that follows are prevented. By the same mechanism, parallel approaches along different lines can be directed against objectives of major importance, such as guided missiles, where such parallel efforts are warranted by the difficulty, importance and manifold aspects of the objective.

Recently a new organization, the Joint Research and Development Board, has been established by the Secretaries of War and Navy, under the able chairmanship of Dr. Vannevar Bush. This agency will bring together all activities of the War and Navy Departments who are furthering research and development, and will so exercise coordination over a wide field.

In understanding the activities of the Bureau of Aeronautics in sponsoring research and development, it is important to recognize the nature of that sponsorship. First of all, it may be stated, broadly, that the Bureau of Aeronautics spends about seven-eighths of its research and development funds with private industry, leaving only about one-eighth to be undertaken in government-owned laboratories. Of this one-eighth, nearly all is developmental testing, and involves little or no true research. This is because the great bulk of the fundamental research which is required to back the Navy aeronautical experimental program is carried out

by the National Advisory Committee Aeronautics. Thus, the Navy's two great experimental centers, the Naval Air Materiel Center at Philadelphia, and the Naval Air Test Center at Patuxent, Maryland, can devote their chief concern to development and test work. At the Naval Air Materiel Center much of the functional and type testing equipment is done. Some of this can be done at no other place, as for example, the testing of engines under simulated altitude conditions, which requires elaborate test installations which for years were available only at the Aeronautical Engine Laboratory at the Naval Air Materiel Center. The Naval Air Test Center is chiefly concerned with flight testing either of prototype aircraft, or of installations which can best be tested while aircraft is in actual flight. A similar test and evaluation center for pilotless aircraft is necessary and is being located at Point Mugu in California.

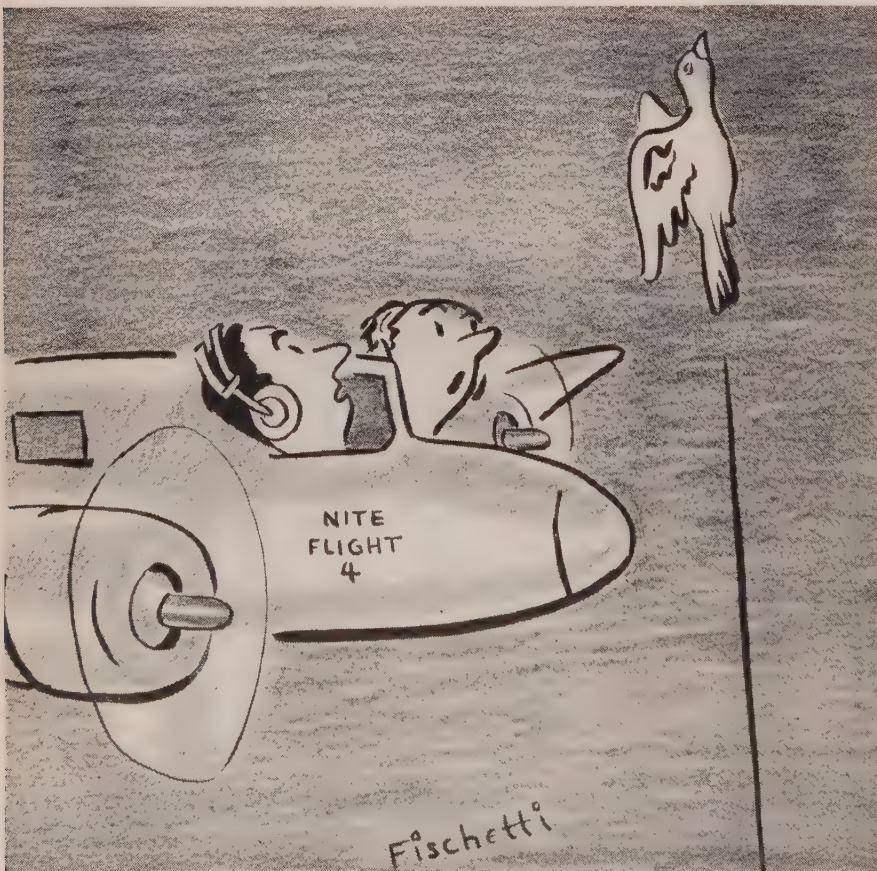
The role of the Bureau of Aeronautics in design development and research is important. Naval aircraft and their components are not designed by the Bureau of Aeronautics. Its function is to understand the conditions and requirements of service operation, to understand the extent and limitations of what industry can produce, and to bring and keep the two together. The service viewpoint in the Bureau is kept strong and healthy by a continual rotation of assignment of experienced operating aviators. A highly skilled and important branch of the Bureau is continually making design studies to determine whether or not the state of the art is capable of producing new models in various classes which provide sufficient advance to be attractive.

When the airplanes were much simpler than they are now, these studies could be made on the drawing board. Now they are made mathematically by continually varying techniques, many of which have had to be invented for the purpose. Ideas from everywhere; from contractors, technical experts, all the various equipment vendors, from scientific laboratories, and from abroad—continually evaluated and checked against the final standard of suitability for naval service use. When a service model requires replacement, or there is a new service requirement which cannot otherwise be met, the Bureau is in a position to appraise the capability of industry to meet new standards of performance and military effectiveness, it sets the goal at which industry can aim with some assurance that we are not asking for the impossible. Those specifications state the performance and size expected, what equipment is required, and what armament, or better, what the armament should accomplish, leaving the contractor a maximum freedom to exercise his inventiveness and ingenuity. A generally similar procedure is followed for components, such as turbine engines, radar, or other mechanisms which are subject to individual development. A good example is the Cal Tech-BuAer of 5-inch air-to-air rocket project. The Bureau of Aeronautics is essentially a complicated skilled organization to finance, select, control, and administer the work which is done elsewhere in this enormously complex field of aviation materiel.

A tremendously important element in the guiding and control of development is the testing and evaluation phase. The end product of the contractor's effort is submitted

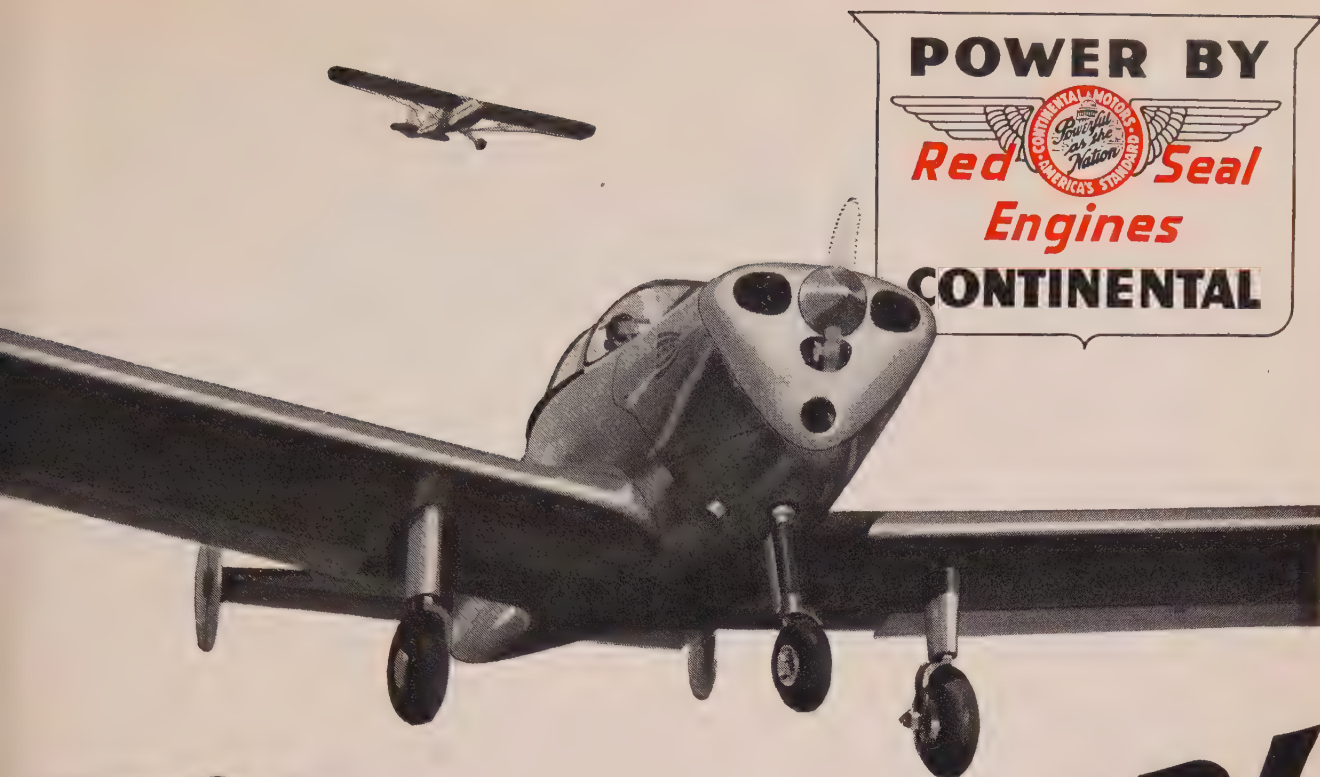
(Continued on page 62)

SKYWAYS



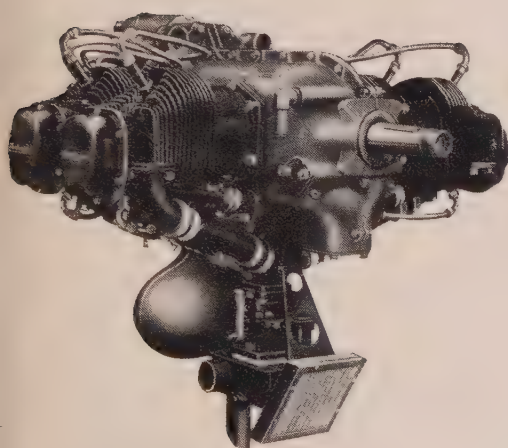
FISCHETTI

"That bird has a terrific rate of climb . . . I hope!"



UP-UP-UP!

WITH CONTINENTAL POWER



CONTINENTAL C75 This 4-cylinder 75 h.p. engine is a recent Continental development. It delivers its full rated horsepower at only 2,275 r.p.m. so that maximum propeller efficiency is attained. Low r.p.m. in relation to power is a characteristic of all Continental personal plane engines.

CONTINENTAL SERVICE EVERYWHERE

North, South, East or West—Red Seal service is available to all planes with Continental Red Seal power. Wherever you fly, you'll find this great nationwide service and parts organization as near as your nearest airport—standing by to keep your plane in the air and assure more hours of flying satisfaction.

When you take delivery — "f.a.f." — of that new 1946 plane, the chances are that you'll fly away with Continental Red Seal power. For Continental leadership, in volume as well as in quality, stands today at an all-time high.

Continental Motors' orders from personal plane manufacturers reflect fliers' overwhelming preference for dependable Red Seal engines. Owners and pilots know that they deliver their take-off and cruising power at engine speeds favorable to top propeller efficiency — that they can rely absolutely on Red Seal power. They know, too, that when they need service, they'll find, at the nearest airport, trained Red Seal mechanics and genuine Red Seal parts.

Red Seal engine production will go up and up still further during the next few months, for new plant facilities are being added as rapidly as this can be done. But the prime consideration, then as now, will be adherence to the quality standards which, maintained over the years, have made Continental Red Seal aircraft engines "fliers' first choice."

Continental Motors Corporation

AIRCRAFT ENGINE DIVISION
MUSKEGON, MICHIGAN

Navy BuAer

(Continued from page 60)

exhaustive tests. The first tests usually show whether the product will ultimately succeed, but almost always some further improvement or correction of deficiencies is necessary. Thus testing becomes a part of the development process. This close relationship between development and testing is being most keenly felt today in the jet-propulsion and gas turbine field, where proper testing facilities are badly lacking. It has been possible in the past to test the pure turbojet engines by hanging them onto an airplane, which is used as a flying test vehicle, but this is no longer possible for testing the newer, large engines, particularly propeller turbines, since the available airplanes are too small for the purpose. All jets require such an enormous volume of air that speed and altitude simulation in test stands on the ground means a very elaborate and expensive plant. The Navy is now placing before the Bureau of the Budget and the Congress the first increment of a \$40,000,000 Aero Turbine Laboratory in order to carry out tests and evaluations that cannot otherwise be conducted.

As to the future trends of development, the program of the Bureau of Aeronautics involves, first, the realization of developments which are reasonably well in sight, and second, the pursuit of more distant objectives. The first, or short term program involves the transition to jet propulsion, the development of propeller turbines and the development of the aircraft which they can make possible. It involves pushing aircraft speeds well into the transonic-speed range, in the neighborhood of the speed of sound, with some piloted flight into the supersonic region. It involves vastly more effective naval aircraft in terms of performance and striking power, and includes both piloted and pilotless varieties. The second, or long-term program, cannot properly have clear-cut objectives at this time. It is enough that this program's broad objectives include supersonic flight of manned and pilotless vehicles, and the utilization of atomic energy in a variety of ways as afforded by the results of programs now in early or planning stages. It is premature to speculate on the exact forms in which the new techniques will combine to form the weapons of the future. Suffice it to say that the difficulty will be, not in finding ways to use the new knowledge of the future, but in selecting from the many possibilities the most effective military combinations.

The development of piloted aircraft as well as pilotless aircraft, is toward greater and greater speeds. Speeds approaching 760 mph, the velocity of sound in air at sea level, appear to be attainable within the near future. Speeds exceeding that velocity are almost certainly attainable within the next five years. These high speeds are possible because of the introduction of new types of power plants into service and because of the advances being made in the aerodynamic fields of research. The greatly increasing rates of climb and the much higher altitudes at which aircraft are capable of operating introduce many additional complications in the design and construction of aircraft. These problems involve further research and study in an almost unlimited scientific field. They present to the airplane designer questions as to how to keep the pilot and crew from

treezing to death or how to give them sufficient air to live on. Medical science is being called upon more and more in the development of aircraft. The question as to how to get the crew out of an airplane which may suffer a casualty at these tremendous speeds is a major problem in itself and one which must be considered at the very beginning of the design of the aircraft. (See *Skyways* November issue.)

As a tool for research into the transonic and supersonic speed ranges the Navy initiated the development of equipment and techniques for the flight testing of aircraft as "nolo" aircraft, controlled by radio and having no pilot on board. This effort is directed toward means of obtaining flight-test data at a point remotely located from the test aircraft, through the use of telemetering, television and radar tracking, as well as the radio control equipment itself. Such equipment is presently available and is being used in the exploration of high speed flight region.

Hydrodynamic research and development work has resulted in considerable improvement in the characteristics of flying boat hulls. The new hulls have acceptable water handling characteristics, improved spray characteristics, and smaller frontal area which results in low air drag for the improvement of high speed. Further research and development work along these lines is required to develop hulls suitable for high landing and take-off speeds on the water. This would lead to further improvement in the high-speed flight performance of flying boats whose uses are important.

At the present time, the investigation of future types of pilotless aircraft includes types capable of operating over a range of altitude from sea-level up to hundreds of miles, and even includes types intended to operate outside of the Earth's atmosphere. Some of these types may be adapted to serve

as carriers of scientific equipment for the investigation of cosmic rays, radio propagation, meteorology and other items. This work has already begun through the cooperation of educational and scientific institutions and the War and Navy Departments in the firing of the German V-2 rockets at White Sands, New Mexico. Eventually, such pilotless aircraft will be supplemented by manned types, just as some of our inhabited military aircraft of today will be supplemented by pilotless aircraft for specialized purposes.

To support the approach to and through the speed of sound, the Bureau of Aeronautics is sponsoring the development of many different types of aircraft power plants. In the field of reciprocating engines development is now limited essentially to improvement of existing type engines. The development of compound engines (reciprocating engine compounded with gas turbines to obtain useful shaft work from otherwise wasted energy in the exhaust gases) now appears desirable and possible because of recent metallurgical developments and the performance improvements resulting from previous gas turbine and turbojet development. Propeller drive gas turbine engines are being developed because of their attractive performance in almost any type subsonic aircraft. They are particularly attractive in moderate to high-speed long-range aircraft. The turbojet engine seems to offer the most attractive power plant for extremely high speed aircraft. The suitability of turbojet aircraft for carriers was recently demonstrated during the successful tests of the McDonnell Phantom (XFD-1) aboard the carrier *Franklin D. Roosevelt*. An operational jet fighter group is being formed.

The work underway on pulse jets and ram jets is directed largely toward the development of satisfactory power plants for pilotless aircraft.

(Continued on page 64)





WILD DUCKS are "buzzed" off California rice fields annually to save this food crop

NO LIMITS HERE

By **DOUGLAS DAWSON**

THE tired duck hunter drove savagely back into town with far less than his limit of Mallards. He had been out before dawn in a blind near a rice field in Northern California; the weather was just right—and then that accursed little airplane came along.

The plane buzzed low over the top of the rice, its slipstream fanning the tops of the grain. Here and there a Mallard broke cover and the little plane wheeled in behind him, herding him away from the expensive rice fields toward the undeveloped swamps of the Sacramento River bottom.

This was very rough for the duck hunter, and the things he called the pilot of that airplane were of sufficient warmth to ripen prematurely the grain around him. Especially when he heard shotgun reports from the airplane and jumped to the conclusion that the pilot was gunning on the wing.

However, the irate hunter might have saved his breath, for by scaring the wildfowl away

from the rice fields, the tiny airplane was saving thousands of dollars worth of rice—an important food crop—from the depredations of the annual duck invasions. And he was doing it with the full knowledge and approval of both wildlife conservation and agricultural authorities.

For the past 10 years many farmers have been protecting their rice fields from the destructive migrating ducks with the use of these little puddle-jumping planes.

A big band of 10,000 to 20,000 ducks will knock down a whole rice field and eat as much as 100 acres a night. Rice farmers tried scarecrows, banging dishpans, and hunters armed with shotguns, all without success in combating the migrating hordes. The wily birds soon became accustomed to the scarecrows and noise of the dishpans, while the hunters on the ground could not patrol enough of the rice paddies to save the crops.

To the rescue came the agricultural pilots

who crop-dust, fertilize, spray chemicals and plant crops from their low-flying aircraft. The pilots use the *Cubs* and Taylorcrafts to "herd" the ducks from the rice fields. These quick turning little trainers are ideal to get down low and chase ducks from field to field at 45 mph until they reach uncultivated fields and marshes along the river banks.

Planes fly two or three times a day depending on the number of ducks in the area; once at dawn, once just before dusk, and perhaps a hop at noon. Farmers pay 50 cents per acre for protection throughout the three-month season in the fall when the birds are migrating. A single plane can patrol up to 16,000 acres, and many pilots work in teams with one pilot picking up the herd of birds where another pilot drops them and rushing them on until they are completely out of the rice growing area.

The method used by these aerial sheriffs is simple. Each plane carries a pilot and a gunner. The division of Fish and Game gives the pilots waivers to shoot out-of-season—to scare the ducks off the water. Gunners are not supposed to wound the birds; merely to frighten them into the air so that the little planes can chase them out of the area.

Experiments were made with wind driven sirens, loud exhaust pipes and whistle-tubes taped to the struts of the planes to scare the ducks, but both residents and the Civil Aeronautics Authority objected. The pilots even tried using small delayed-action bombs to get the ducks off the water but the fuses were none too accurate and many exploded too close to the planes for comfort.

Veteran of 10 years of duck herding is L. B. Mitchell, of Chico, California. He says that "all you've got to do is to scare the ducks up out of the rice. Then you can herd them any way you wish. Usually they'll take off when they hear the plane's engine, but sometimes it takes a shotgun shell to get them into the air. The farmers furnish the shells and we usually use about two boxes on a two-hour flight.

"The ducks usually congregate in the water holes of the rice fields, so we buzz the holes and flush them out. It works very well and saves the farmers a lot of money in damaged crops. Sometimes a farmer isn't sold on this type of crop-insurance until we take him along for a ride while we work on other farms. After he sees how well it works, he usually wants a plane to patrol his lands.

"Our best recommendation of the efficiency of the planes is the steady stream of discouraged duck hunters who can't get a limit of birds in the areas we patrol."



RICE, shoulder high here, is planted to control swampy areas. Ideal for ducks



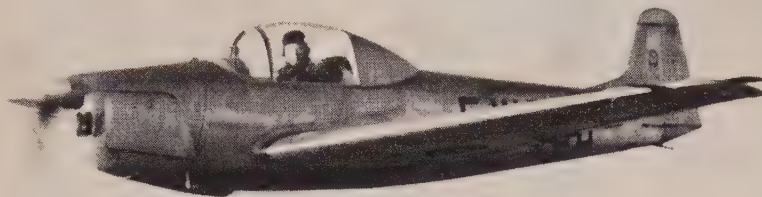
PLANE is manned by two and a shot gun. The gun is used to frighten ducks off



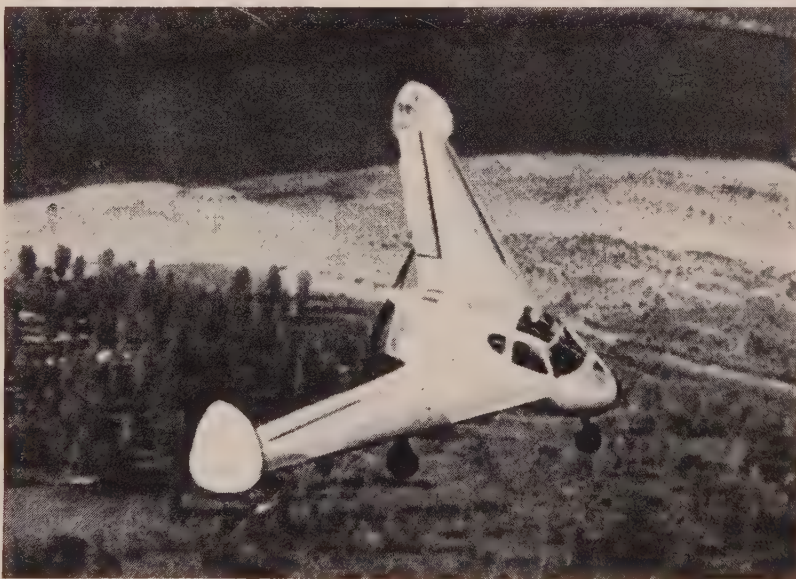
WATER holes in fields appeal to ducks. Pilots flush them out and herd them off

Newest French Personal Planes

Personal flying in France recently was given a boost by the announcement of three new private planes. These are the MS 560, a low-wing, retractable landing gear ship; the SE 2100, a tailless two-seater; and the SO 3050, a low-wing two-place plane. Most interesting from design standpoint is the SE 2100 "tailless."



FRENCH MS 560 (above) has top speed of 146 mph, cruises at 129 mph, has 621-mile range. The SE 2100 (below) cruises at 117 mph. Range of 518 miles



LIGHTPLANE FIELD has another newcomer in the SO 3050, two-place ship with a top speed of 164 mph., cruising speed of 146 mph., range of 620 miles



less aircraft or guided missiles, where rocket engines, which are peculiarly suitable for flight outside the atmosphere, are already widely used for jet-assisted take-off or JATO, of piloted aircraft.

Future launching devices from ships will have to handle heavier aircraft at high speeds with little or no increase in space available. Such requirements will necessitate improved efficiency in JATO rockets and the development of new designs and sources of energy for catapults. The Navy's JATO research program involves development of new fuels, increased capacity. One of several radical new types under test is an unique electric model, the XE 2, which employs a linear induction motor 1,400 ft. long and approximately 3 ft. wide. New types of catapults for pilotless aircraft will not be limited as to acceleration by the presence of the relatively frail human body. Such catapults now employ accelerations in excess of eighteen times that of gravity. Eventually pilotless aircraft will be launched at accelerations high enough to place the catapult in a class with low-velocity cannon.

Particular emphasis is being placed on the difficulties of fire control at high speeds, where the time, on one run, in which an airplane can engage the enemy is a matter of 3 to 5 seconds. Aircraft capable of operating at night or under bad weather conditions will, it is planned, be provided with every possible radar aid and other type of device which will enable them to defend themselves and release their loads accurately.

The current research and development program for instruments and navigation equipment is directed largely toward simplifying the pilot's job by making instrument and navigation equipment less complicated, more reliable, easier to use and interpret, and, where possible, by substituting dependable automatic controls for manual operations.

The specialized needs of naval aviation require experimentation and development in nearly every aspect of the complex fields that aviation now embraces. Search and rescue equipment undergoes constant study to meet changing operating conditions. The protection of fuel and oil systems against gun fire continues to receive close attention. Continued development of cabin pressurization to permit flight at extreme altitudes is proceeding at a high priority. Cabin cooling to provide greater comfort for pilots flying at subsonic and supersonic speeds is also receiving active and continuing attention. Improved materials are required, particularly those materials resistant to extremely high temperatures and to corrosion.

Many of these research and development programs were given impetus by clear realizations of what we needed as a result of the last World War. The cessation of actual hostilities has permitted concentration and resolution of thought adding additional impetus. That these programs should now be pushed through to actual results, to convert possibility into potentiality, is a matter of national interest. For on these and similar programs, delving farther and farther into the frontiers of the unknown, will depend the technological stature of this Nation and upon that, as every man knows, depends very possibly its future destiny.

STANDARD OF CALIFORNIA'S

PLANE FAX



A page of service tips for private flyers and fixed-base operators

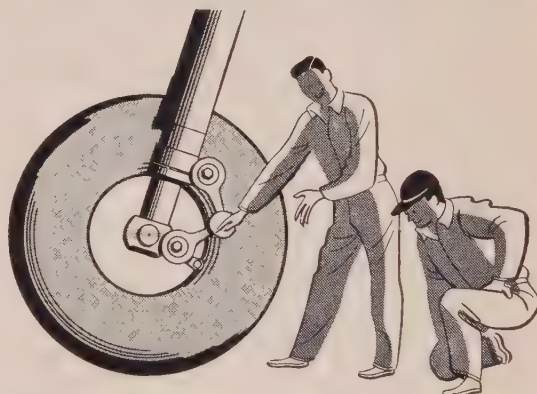
Sticking valves are often traced to lead deposits



Sticking and burnt valves in personal plane engines not designed for leaded fuels, are often traced to lead deposits caused by using gasoline which has been fortified with tetraethyl lead to boost octane rating. To eliminate this danger, Standard of California provides an unleaded 80-octane Chevron Aviation Gasoline. A high proportion of "alkylates" (blending agents used in fighter plane fuel) are used instead of tetraethyl lead to achieve Chevron Aviation Gasoline's high-octane rating.

Grease-streaked wheels warn of weak-kneed lube

When brakes of even a light airplane are applied, friction shoots temperatures to high levels. A grease not built for such heat, melts, runs out on brakes and wheels. To assure complete protection under top temperatures, be sure your plane's wheel bearings get RPM Aviation Grease No. 2. It's built to stand high temperatures, therefore it won't melt and run over brakes, neither will it congeal at low temperatures and lock wheels. RPM Aviation Grease No. 2 was especially designed in Standard of California laboratories to meet aircraft problems.



Flight school finds new oil doubles overhaul interval

John Schwaner of Sacramento Sky Ranch writes: "Last year we experienced considerable ring and valve sticking when using a popular un-compounded oil in our 65 hp. training airplanes. We then ran careful flight comparison between the above oil and RPM Aviation Oil. We experienced valve and ring sticking between 300 and 400 hours in the engines operating on the un-compounded oil, while the engines on RPM Aviation Oil ran more than 700 hours with excellent results."



CHEVRON NATIONAL CREDIT CARDS are good at airports throughout the United States and Canada. Ask your Standard Airport Dealer in the West . . . or write to Standard of California, 225 Bush Street, Room 1618, San Francisco 20, California.





Trail Driver

(Continued from page 40)

cheerily, but so modestly that a tyro might be deceived into the notion that mid-winter flying over one of the world's most temperamental passes could be done by a novice.

"How did you happen to start flying at the age of 74?" is the question most often asked Starr Nelson. While he was a student pilot he wrote this explanation:

"Thinking it might be of some interest to those who have only a slight knowledge of flying and a great deal more to those who are contemplating a deeper interest in the art, I will try to give you some of the feelings and sensations experienced by a beginner who consigns his all to the safety and keeping of a combination of steel tubing, light wood, linen fabric and a gas engine to take him many thousands of feet into the air at a speed never before experienced by man, covering thousands of miles of the earth's surface—the limit being governed only by his gas and oil supply—and land him safely when that fuel is exhausted.

"One must surely have faith in his ship and some confidence in his own ability if he is to become a pilot. I went to California three years ago with the avowed intention of learning to fly, but they told me I was too old; that I could not pass the physical examination and that I had lost that essential courage which belongs to youth alone. Yes, I allowed myself to be dissuaded. To tell the truth it was not hard to do, for my feet were never any too warm and a chill was easy to take.

"When I heard of the students of the Mesa Junior College taking lessons in flying, I went there to get firsthand information and when I saw what they were doing, I made up my mind that I was made of the same stuff they were and could, and would, do what they were doing. Then and there I signed up for the course. That was about the middle of February (1940) and today (1941) I am going down three times a week and flying, sometimes solo, sometimes dual. To say

it gives me a thrill only feebly expresses it.

"But back to the sensations. Many years ago I was placed in a position where I had to jump to safety 36 feet straight down. I lit squarely on my feet on the hard ground. The impact was so great it broke my back, both my ankles and ruptured me. I was consequently consigned to the scrap pile. I objected, however, and instead of making a die of it, I have put in some 40 years of busy life, and I'm still holding the main line. But that fall put a fear and dread into me of going aloft and it has been one of the hardest things I have had to overcome. My knees would tremble and my body would become rigid as glass and I had the sensation of falling. On my first flight I said to myself, 'If I ever do get down I'll stay there—but then I would be a quitter, and I am not a quitter.' So I kept going up. As time went on that fear and dread began to wear away and now I can look down on a checkerboard of farms and enjoy the beauty and work going on below.

"Don't try to be a pilot unless you have a lot of determination. One day you'll be filled with enthusiasm and the next, you'll hate yourself, call yourself a fool and swear never to go up again. You'll make bum take-offs, poor landings and it'll seem as though you will never be able to get the feel of things. Landing was the hardest for me, but the take-off requires the most concern of all, in my opinion. You have neither altitude nor speed to come to your assistance in case of accident. Then you have such maneuvers as the spin, the stall, and the side and front slip to perfect. My first sensation in these will be with me forever.

"My instructor took me up 9,000 feet above sea level early in the game and told me he would do the stall. Then I was to do it after him. Well, I was about as much prepared for what happened as a person who had never been up. I paid close attention and did my best to catch on. The instructor turned the plane's nose almost straight up and she did her best to keep going and finally came to a stop. At that point he pitched her forward with the stick and away we went for

a toboggan ride of 45 degrees down toward the earth. Then gradually up again to about the same altitude from which we had started. Here he leveled her off again and said, 'Now you do it.'

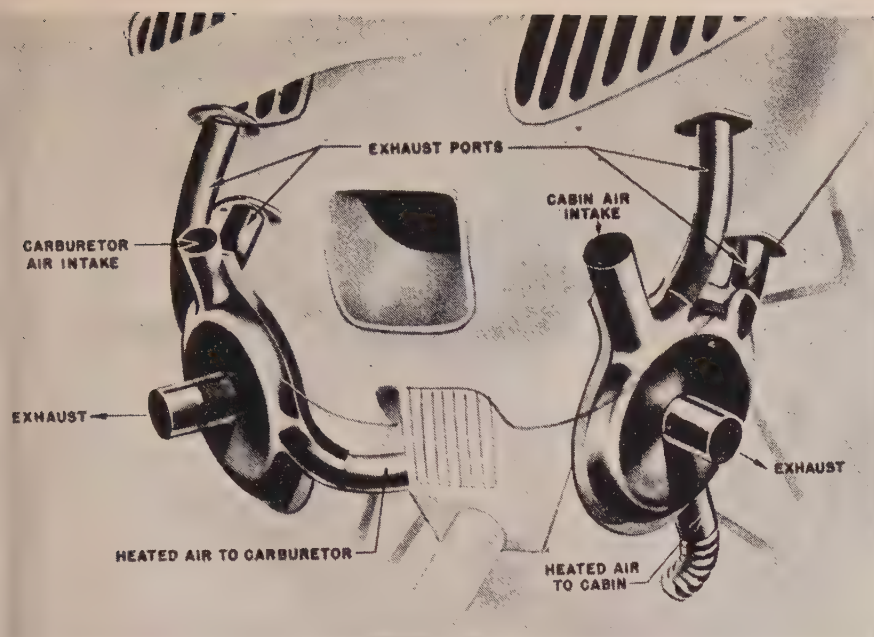
"The ship had a full load as we were above average men, and the parachutes weighed some 50 pounds. As commanded, I turned her nose to the sky and when she stopped, I pushed the stick ahead much farther than I should have. Instead of a 45-degree incline we headed straight down for Mother Earth at about 250 mph. I was looking as straight down as if into a well. I gulped—and decided right then my time had come. The instructor calmly reached for the stick and eased her back. After leveling off for me, he told me to try again. By this time I'd had my lesson and so made three good stalls before landing.

Adventure seems to have singled out Starr Nelson and paid him particular attention. Once when Starr was faced with the necessity of returning a grandson to his home in Texas, he found himself several thousand feet up flying a Piper Cruiser—with Old Man Mountain on his left, wearing his usual poker face, and on the right squatted Gambler Wind, slyly grinning and drumming his finger-tips on the mesa-tops as if he knew that it was Starr's first game of cross-country flying. In addition there lay around him several hundred miles of untried mountain-peaks. Backing up the opposition of wind and altitude was the fact that meteorology was, and still is at many small fields, only a squalling infant. And air-marking for personal and light-plane pilots is the unknown quantity. Starr, although accustomed to sailing above the lumpy whiteness of altocumulus clouds, was forced to navigate by dead reckoning and without radio benefit. All of these conditions conspired to make a rugged gamble of the trip.

From his home he required over 13,000 feet of altitude to safely clear the mountain ranges. Soon a lapse in the motor-hum tossed him a warning. Pulling on his carburetor heat, he found the answer to that old problem of icing. But in the process of clearing the carburetor, Starr lost several hundred feet in altitude. His position wasn't comfortable. Starr could either run the danger of over-using the heater and not make the needed 13,500 feet to clear the range, or turn back. He chose the former condition and in a few minutes, after almost scraping the mountain peaks as he edged over the range, he saw to his immense relief the Valley of the San Luis stretching below. He followed the Rio Grande River into Alamosa (Colo.), landed for lunch, refueled and requested direction toward Raton, New Mexico.

On this trip Nelson was using road maps with straight lines drawn from place to place. He used his protractor to get compass bearings. A pilot at the airport suggested that to get to Raton he take a straight line over the highest of three peaks rising from the Valley, fly 100 miles, then look for a big lake at the left. When even with it, he was to turn to the left and there would be Raton. In telling about it, he said, "The feeble-minded are usually cared for, so I took off." He found the lake but was uncertain of how far to veer. With the wind on his left, he turned in that direction and flew until he felt he was on the wrong course. At that moment he spotted a black streak on

(Continued on page 68)



INSTALLATION of new Ryan lightplane muffler is shown in this diagram. This muffler is said to eliminate about 90 per cent of the objectionable noise of an engine exhaust

THAT PROBLEM OF NOISE

MUCH of the complaint against private flying comes from people living close to airports. These people shriek in horror and give out with strange mumblings when questioned about the airport activities. Most of this cause for complaint seems to arise from the so-called "so much noise the lightplanes make." There are two approaches to that question of noise; one is the easy way—to say that the people will soon become accustomed to it and won't even notice it, while the other . . . and the hardest but best answer . . . is to really do something about lessening the noise from lightplanes. Ryan Aeronautical, designer and builder of the well-known *Fireball*, has come up with a beginning answer to the problem of aircraft noise. And to Ryan should go the thanks and appreciation of the thousands of lightplaners who are today fighting opposition to airports within their own communities because of the lightplane's noise factor.

Ryan has designed a new lightplane muffler which eliminates 90 per cent of the objectionable noise of the engine exhaust. It is made of lightweight stainless steel and fits aircraft engines of from 65 to 85 horsepower.

The new muffler not only eliminates much of the exhaust noise but also is in itself a complete exhaust system that also has provisions for heating the carburetor air and for delivering heat to the cabin for the comfort of the plane passengers. It is indeed a piece of equipment that will automatically "deluxe" any of the standard 65 to 85-hp planes, and it's approved by CAA, too.

In its CAA approval tests, the Ryan muffler demonstrated carburetor heat-rise characteristics that were far above the government specifications which call for a 90 degree (F) rise with 30 degrees (F) outside air temperature at 75 per cent engine power.

In general, mufflers allow the airplane en-

gine gases to cool momentarily and to dissipate in an expansion chamber before they are released to the outside air. The loudness of the gases' "pop" as they expand into the air is decreased by this reduction in velocity. In many cases, however, this causes a back pressure which in turn causes a loss of power. The Ryan muffler, however, seems to have this licked for tests showed only an engine power loss of less than 2 per cent.

Most lightplanes today employ either short exhaust stacks or semi-collectors made of a mild steel. This does not add to either muffling or, in many instances, adequate cabin and carburetor heating. The Ryan muffler

provides all of these additional functions and, with both cabin and carburetor heat shrouds, the complete unit weighs only 8 pounds.

Engineers who designed this new muffler kept quick, easy installation and inspection in mind. As a result not only is inspection easy but the unit itself can be installed without removing either the propeller or engine accessories of the personal plane. This is a welcome aid to maintenance when one considers that to remove most factory-provided exhaust systems, a mechanic has to remove the engine cowling, the prop, the engine and the engine's oil tank and cylinder-cooling baffles. Not a small job.

Present production models of the Ryan muffler are now only available for four-cylinder "flat" engines of from 65 to 85 horsepower. Development, however, is already underway to provide a similar muffler set-up for the higher horsepower engines used in many of the newly announced personal planes as well as light commercial ships.

Naturally, this muffler does not eliminate all the noise of a lightplane. There still exists that bugaboo of propeller noise. At the lightplane engineering conference at NACA's Langley Field early last fall this problem received a good deal of attention. One engineer reported that there was no technical reason why an airplane propeller could not be made as quiet as a helicopter rotor. One way to achieve this, he said, would be to use an eight-blade propeller with a two-position variable pitch. This would not only be very much quieter than the standard two-blade prop but would have 4 per cent shorter take-off distance than the two-blader. The most often voiced objection to the eight-blade proposal for lightplanes is its weight and complexity, but that can be solved, too. Maybe this is a "beginning" answer to the prop-noise problem, and an eventual companion-piece to work with the engine muffler.

With the use of this new Ryan exhaust system that does take care of 90 per cent of the engine noise, though, a great stride forward has been made. Undoubtedly the problem of prop noise, too, will find as able a solution. But in the meantime, thanks to Ryan Aeronautical for helping plenty.



CARBURETOR HEAT and cabin air heating also is provided by this new Ryan muffler. Here a mechanic explains its installation to pretty Betty Huges, San Diego aviatrix

Trail Driver

(Continued from page 66)

the Valley's floor that looked like a runway. It most fortunately unfolded into a new airport with its mat in process of being laid. The attendants' astonishment at seeing a 77-year old man drop from the skies was so great that they made him the honored guest for the night. The next day he landed in Borger, Texas, the home of his son, Wallis, and spent a much more pleasant week than he would have had he known that the elements were waiting with a sleeveful of tricks.

On that return trip, everything ticked off perfectly until Nelson reached Alamosa, Colorado, where he stayed over to have an oil leak in his engine fixed. His next hop was to be Montrose, Colo., on the Western Slope of the Rockies. It was a wonderful Sunday morning and Starr was eager to be off over that thickly wooded range with its steep sides flying all the brilliant autumn colors. He started climbing at Alamosa to make 13,500 feet to insure clearance over the range. Scarcely had he started when raging convection currents suddenly leaped upon him from no visible source. Considering the disturbance a whirlwind that would soon pass,

he flew on. He had climbed 13,400 feet and was almost over the range when WHAM!—the plane was slapped down 2,400 feet by a down-draft. One minute Starr had been looking down at Old Man Mountain's scowling face—the next he was looking up 1,000 feet at the menace.

In the face of this chilling barrier Nelson banked as far as he dared for a high-speed diving right turn and missed the range's massive face by an arm's length. Said he, "If the trees had been peach trees, I could have picked a peach. I got back over the Valley and thanked God for His goodness."

Then he followed along the range until he came to a creek and headed up it, but it was playing into the Wind's hand again and it took him off his course, pointing him toward the city of Gunnison. The windshield was covered with oil and though there was plenty of gas, he realized that he was making no progress. Applying the logic of an engineer who doesn't turn back when danger is ahead, he looked for another course. It proved to be a saddle between two mountains. But again the wind caught him in a down-draft. Nelson declared that from then on if he had not been a bronco rider in his youth, he could never have ridden into Gunnison. Tops of haystacks in the Tomochi

Valley were sailing into the clouds. Circling the town he decided to land on an improvised, undesignated landing strip.

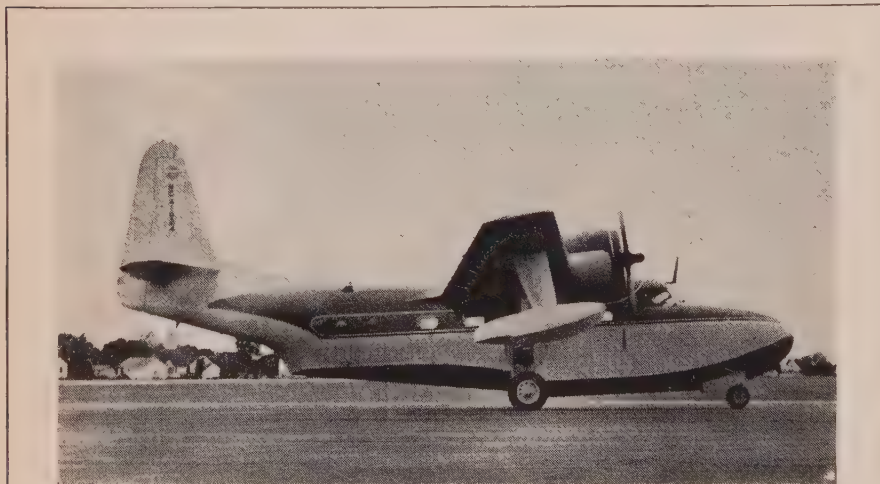
Starr came in with power on and dropped his right wing when he felt the ground, to keep the wind from getting under it. The gale skidded him sidewise and ahead. With the weight on the right wheel and side-draft severe, the shock-cord held for 40 feet, then broke and let the right side go to the ground. Both tips flew off the propeller. Crawling out on the struts as far as possible Starr there while the plane was being buffeted about. It was the only thing he could do to keep the plane from being blown completely over. After what seemed an age, he heard a voice saying, "It must have killed the pilot. I don't see him." Starr shouted . . . and they soon had the plane staked down.

All of this taught Starr Nelson a lot. And he offered a few tips for mountain pilots:

1. Fuel may be saved against headwinds by flying the canyons but one must know how canyon design well enough to avoid turning into a dead-end one.
2. The next danger is downdrafts on the lee or sheltered side of a mountain. If caught in one, with power on turn the plane's nose down and come out by diving turns at high speed.
3. Do not fight agitated air with control. Relax and coax the plane back to level.
4. Be weatherwise. Learn to read the clouds. The terms Nimbostratus (rain-cloud), Cumulus (Fairweather cloud), Cumulonimbus (Thunderheads), etc., may be bothersome to learn but knowledge of them brings greater security. Learning to read weather charts and the meaning of such terms as "high" and "low" may spell the difference between an easy and a crash landing.
5. Agitate constantly for better equipped engines to negotiate mountain headwinds and for greater fuel capacity because of greater distances between airports.
6. Encourage the development and marking of airways with a uniform system.

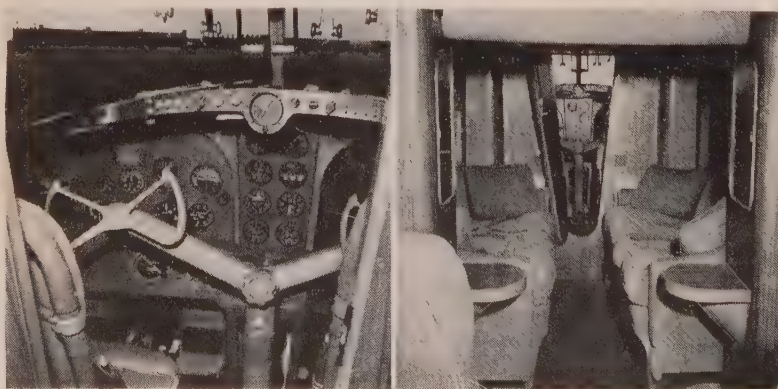
At present Starr Nelson is piloting a new plane over the Rockies. On a recent trip over the Sangre de Christo Range, clearing Veta Pass by 2,000 feet, his thermometer registering 10 degrees below zero, he thought winged backward over a life that waves like an unfurled banner behind him.

It was in the spring of 1884 that he joined a group of traildrivers driving a herd of 3,500 head of long-horn steers to Dodge City, Kansas. From there he brought a trailherd into the Rocky Mountains over one of the most tortuous routes in the history of trailing. The next phase of his life was that of locomotive engineer for the D&RG Railroad over Marshall Pass. For the next 20 years his engines plowed the everlasting snows of the Continental Divide. He recalled double-heading over this same Veta Pass when two of the best locomotives were required to pull a train of four or five cars. He heard the farewell wail of the narrow-gauge engine, but he had no time for regret because his forward reaching senses had caught the whirr of motors in the distance. When he experienced the recent thrill of occupying the cab of a 5,400-hp Diesel he declared it to be *almost* like flying. Said this octogenarian, most of whose fellows are satisfied with sitting in the sun, "There's nothing equal to knocking off more than 100 mph with the sensation of having nothing under you but the seat of your pants."



NEW GRUMMAN AMPHIBIAN

A new 8 to 10-place amphibian recently was announced by Grumman Aircraft. Designed as a commuter plane or executive transport, the *Mallard* features a two-section cabin fitted with twin facing divans and four reclining airline-type chairs. The interior is soundproofed, upholstered and carpeted. The pilot's cockpit features the radio controls along the cockpit rim. It is powered by two 600-hp P & W's.



Your Reporter Flies THE RAWDON T-1

By SELBY CALKINS

AN AIRPLANE design project born during the wartime search for answers to specialized military requirements is today exciting keen interest . . . a lightplane which will work out of small, rough fields hardly to be dignified by the term "airport."

A pair of midwestern brothers named Gene and Herb Rawdon, veterans of the aircraft building and flying business, are enjoying the distinction—if somewhat prematurely—of providing the truth of the old proverb about "Build a better mousetrap and the world will beat a path to your door."

They have built a better lightplane, albeit for a specialized purpose, and the word-of-mouth reports that have gone out about it from their Wichita plant have brought them inquiries by the score. The total is now in four figures and still mounting, though the Rawdons have done no advertising.

The answer lies in their airplane. A low-wing monoplane weighing 1,075 pounds empty, and with a maximum allowable gross of 1,700 pounds, it has a test-proved top speed of 130 mph, lands at a feathery 40 mph in zero wind, and will climb out of a 500-foot field over a 500-foot high row of trees. These aren't just figures. Jack Chastain, Rawdon's test pilot, will prove it to you at the drop of a skeptical glance.

Here is Chastain's standard Doubting Thomas indoctrination flight demonstration:

Take off in a run of seven seconds from a dead stop, pulling off at such a steep angle that the tail wheel hits the ground after the main gear is off . . . climb at that sharp angle at the rate of 1100 fpm . . . level off and then do all the aerobatic stunts in the book . . . climax that portion of the show with a series of three loops, with a snap-roll at the top of the third, and show a loss of only 300 feet, net . . . come back across the field in slow flight with the airspeed needle flickering just above 45 mph . . . swing into the final approach and drift to earth in a power-off landing so slow that the resultant roll is less than four lengths of the plane! By then you are a true believer.

The Rawdons have been a long time in aviation. Herb is an assistant chief engineer at Beech Aircraft, and Gene runs their own plant, repair station and flying school at their field across the road from the Beech factory.



ROUGH-FIELD operation requires a "rugged but right" craft like the Rawdon tandem

During the war Rawdon plant was a subcontractor to Beech, and since the war the Rawdon canopy for Fairchild and Stearman PT's has become virtually standard equipment for sportsman pilots who have bought and relicensed those popular trainers.

During the years they have been in the business, Herb and Gene have felt that there was a place in the business for an airplane designed to do two things: One, to operate in and out of small fields surrounded by obstacles, or at mountainous altitudes, and two, to have superlative control characteristics in order to reduce to the minimum chances for pilots to get into trouble on or near the ground in bad wind conditions.

Their first move toward making that airplane a reality was an exhaustive study of airfoils, and adoption of the famous German Goettingen airfoil for their wing. This, they felt, gave them a wing with the best possible stall characteristics.

Their second decision was to avoid any compromise whatever with ruggedness of construction. Thus, in a design world today

bent on eliminating struts and such drag elements, the Rawdon T-1 is characterized by a rugged strut braced construction. They also went all out in the matter of a wide landing gear, and the present model has a tread of 9 feet 6 inches—almost a third of the total span of 33 feet 3 inches.

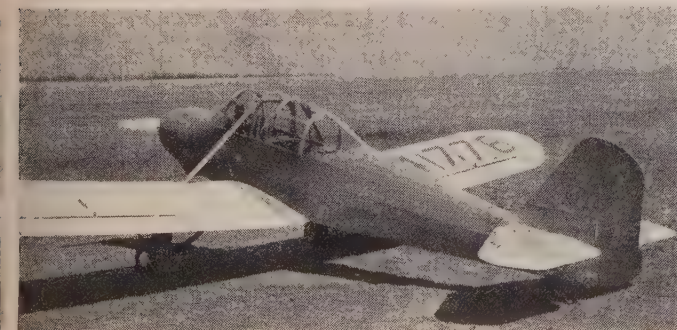
NX 41776 may soon have an "NC" prefix as the first of a series of Rawdon planes incorporating the same special performance characteristics. The Rawdons plan to produce the two-place, closed tandem job in the \$3,500 price class.

The tandem trainer production model, of which the T-1 is the prototype, will be equipped with the Beech controllable-pitch propeller. Performance figures call for a top speed of 130 hp at sea level at full power, and a cruising speed of 120 mph. Service ceiling is expected to be 18,000 feet. Fuel capacity is now 24 gallons, giving a duration of three hours or more depending on cruise power settings chosen by the pilot. Rate of climb for the first thousand feet, with a Beech prop, is 1100 fpm.



ENGINE is 125-hp Lycoming. Ship cruises at 120 mph

STYLED for farmers and ranchers, T-1 is a sturdy ship



The Cosmic Ray

(Continued from page 27)

Very soon after a proton enters the atmosphere, it strikes a molecule of air and a violent explosion occurs. While the explosion is great, it is still sub-microscopic, so we cannot see it with our eyes or even with strong instruments. However, we do know what happens as a result.

When a proton hits an air molecule, it shatters the core of the atoms of air. In doing so, the original energy, or speed, of the proton is combined with the energy of each atom of air and produces approximately five other particles of varying energy, called "mesons." It is important to understand this reaction, for we will hear more and more of mesons in the future.

As an example, take a high-powered rifle bullet which goes through a brick wall. The bullet which enters the wall is made of pure steel and has a terrific striking force. This energy is combined with the clay and cement of the wall, so that when the bullet emerges from the other side it is no longer pure steel, but a composition of steel, clay, straw, and cement. As it is also slowed down, it cannot be considered the same as the original projectile. This is exactly what happens to the proton, or cosmic ray.

The mesons that are formed in each upper-air collision live for only 1/500,000 of a second, but since they have much of the original energy of the proton, they can travel amazing distances before they die. The actual distances traveled differ considerably, for mesons have highly varied speeds. For example, some crawl along at a turtle-like 50,000 miles a second and are called "slow mesons."

It is these slow mesons the scientists are currently studying in high-flying B-29's. By concentrating on slow mesons, the technicians can determine the exact number of protons which have penetrated to a specified altitude.

However, the death of the mesons does not stop activity. In dying, they produce electrons which in turn create photons (these are similar to X-rays), and photons then produce additional electrons.

Simply expressed this reaction resembles the following equation:

$$\begin{aligned} 1 \text{ proton} + 1 \text{ atom of air} &= 5 \text{ mesons} \\ \text{mesons} &= \text{electrons} \\ \text{electrons} &= \text{photons} \\ \text{photons} &= \text{electrons} \\ &\text{etc.} \end{aligned}$$

This chain reaction of electrons-photons-electrons gradually fades and eventually dies altogether, but it is believed to be the cause of strong electrical and radio interference in airplanes remaining at high altitudes more than a few hours.

To continue, however, we must return to the meson. This particle has been called the most penetrating thing in all physics. Since it is heavier than the cosmic ray and packs much the same wallop, it is potentially a greater source of power. Dr. W. F. G. Swann, of the Bartol Research Foundation, recently said that the energy of the meson, if it could be harnessed, was 100 million million times more powerful than the particles which are concerned in the atomic bomb. And 100 million million is 100 trillion, which written out in figures is 100,000,000,000,000!

Because of this, scientists are more interested in the meson than they are in the original cosmic ray. The few scientists who have emerged sufficiently from their ivory towers to permit themselves to be quoted, have indicated that the meson may provide greater use of atomic energy. They point out that in spite of amazing progress made in the harnessing of atomic energy, only one-tenth of 1 per cent of the potential energy of the atom is now being used.

They also feel that science may be able to utilize the striking force of the meson to shatter the atom, completely, and employ its full force. This would mean that present atomic energy would be increased 1,000

times! However, this is entirely futuristic at this time because there now is no known method to harness the meson nor to simulate it in a laboratory. When mesonic power will be used cannot be predicted.

As for power directly from the cosmic ray or mesons, scientists say that if we could harness all the cosmic rays and mesons in a square mile, the total energy produced would probably be sufficient only to keep an electric iron hot. The power of the cosmic ray lies not in itself but in its effect on the atom or anything it strikes.

Therefore, researchers who should know, scoff at any mention of cosmic ray bombs as such, although they hastily advise that more terrifying atom bombs may be developed as a result of cosmic ray research.

Now, how does this country's research compare with that of other nations?

There are no published statistics on the extent of research of other major nations. However, in order to carry bulky and heavy instruments sufficiently high to make accurate studies in the upper air regions, where meson activity is the greatest (actually the greatest meson activity is over 100 miles high), a powerful vehicle is necessary.

In the B-29 we have the ideal vehicle to do this work. AAF B-29's have been operating up to 40,000 feet, carrying banks of Geiger counters, portable cloud chambers, and other instruments, in the current research of the upper-air regions.

The fact that no other country so far has developed a similar aircraft would seem fairly indicative that we have progressed ahead of any others in this basic research.

This doesn't mean that experiments had not been made prior to the introduction of the B-29, for this would be untruthful. More than 10 years ago the National Geographic Society and the Army Air Forces sent the "Explorer II" stratosphere balloon above 72,000 feet. It was equipped with special instruments to study the cosmic ray. This altitude record still remains the highest that a human has ascended.

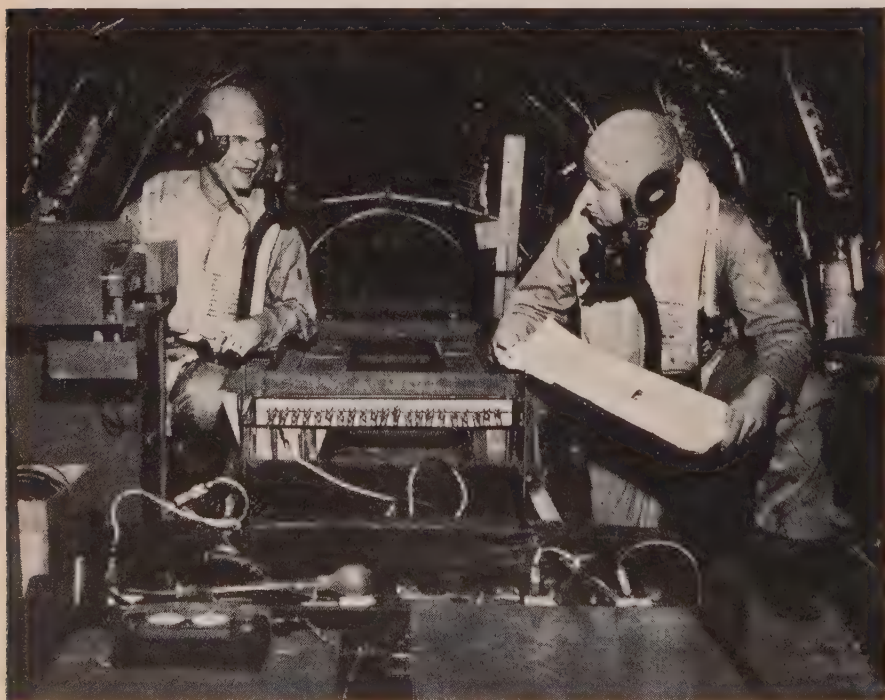
However, balloon flights were few and far between, whereas B-29's have been making several flights a week for many months.

In what manner is this country conducting cosmic ray research? As basic research of such an unknown quantity is very expensive to civilian researchers, the military services have used their resources to aid universities and science organizations in upper-air studies.

The Navy, with its vast funds, has endowed over a hundred universities with financial grants, buying instruments and paying salaries of technicians. The Army Air Forces has donated Superforts, crews, and maintenance personnel. The two services are carefully reviewing the result of the investigations with a thought to applying the new-found knowledge to tactical use. Both services have picked officers attending leading universities to learn the newest in the field of nuclear physics.

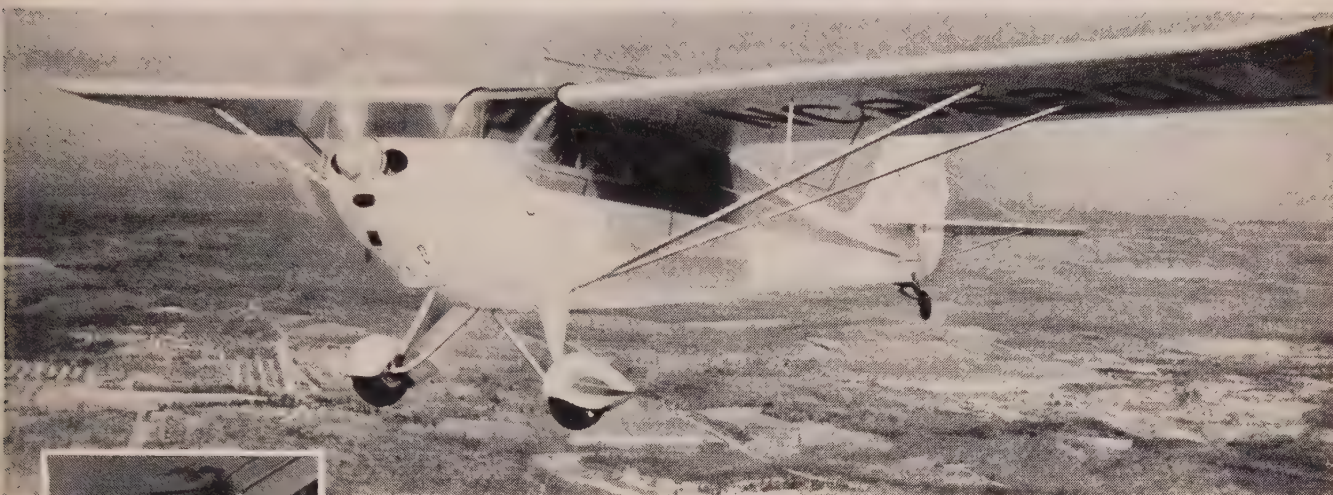
Science admonishes us not to expect any practical results from present studies for many years. Basic research, which was terminated during the war, has only picked up the threads and started anew. It will take a lot more study and research, involving years or possibly even generations, before the new Age of Miracles will arrive.

In the meantime, we are making progress and as long as the people continue to support research, progress will continue.



GECOR COUNTERS (center), installed in converted B-29, measure the number of cosmic rays found at altitudes between 5,000 and 35,000 feet on research flights

TRAINED OVER 3500 LIGHT-PLANE PILOTS



FLIES AERONCA TODAY!

**LT. COL. T. STEWART BAKER, FORMER DIRECTOR OF FLIGHT
TRAINING FOR ARMY GROUND FORCE AIR TRAINING SCHOOL**

WANT an expert's opinion? Here's your man! Col. Baker headed up flight training for the Army Ground Force Air Training School. He trained thousands of pilots *not only in Aeroncas but in almost every other known make of light plane.*

TODAY HE FLIES AERONCA!

Yes, back again in his civilian position with Aero Training and Transport, Inc., at Lunken Airport, Col. Baker is yet another ex-service pilot who *knows his*

planes, knows his flying and chooses Aeronca over all others!

Aeronca's plenty proud of being the overwhelming choice of so many ex-service flyers. It's proof of Aeronca's superiority in design, engineering, and flight performance. And the thousands of non-flyers who flock to Aeronca prove its unequaled flying ease.

Take the Aeronca Chief. Here's the de luxe two-place plane in the low price field. You get handy starter, fine visibility, Oleo land-

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*America's No. 1
Low Cost Plane*



NIGHT LANDINGS have been given due consideration and landing lights are inserted in leading edge of V's wings. Note baggage compartment cover on raised hatch above

Culver Model V

(Continued from page 34)

up under his chin as is too often the case in personal aircraft. The seats (separated by the center column) are adjustable, so the first thing I did upon getting in was to run mine fully forward on its track. One of my ideas about safety is being able to reach the rudder pedals and the brakes. On the Culver, the brakes are only on the left, the pilot's side, a point which this pilot has in common favor with Culver's designers and sales department.

Starting procedure, because the V's Continental 85-hp engine has a fuel injector and two-position (Sensenich) hydraulic prop, differs from a conventional set-up to take into account low-pitch position for the prop control and operation of wobble pump and primer for the fuel system. Starting the Culver V is not complicated . . . prop in low pitch, wobble pump operated for fuel pressure, one prime to spray the carburetor, a turn of the starter switch—and that's it.

Taxiing in the Culver will leave you a fan forevermore of the tricycle landing gear. I purposely headed for the uneven ground (visibility being what it is, such spots easily could be seen even when they were right in front of the nose wheel). I soon realized everything about the plane tilted except its occupants—a most satisfying experience. Guiding came from the rudder pedal, linked to a swiveling nosewheel. Brake action brought us to prompt stops.

Take-off is performed with the same ease as taxiing—and good visibility is one reason not to be overlooked. Too much rudder action will work against a smooth take-off run. It's best to line up straight down the runway and, easing the throttle in, use rudder only after corrections become necessary. At an indicated airspeed of 60 mph you ease back on the stick and "lift" the Culver off.

Climb after take-off soon indicated 70 mph and a rate-of-climb indicator gave 600 fpm as the V's performance in the rough air close to the ground. (Here again, this time

in a climb, visibility proved to be very good. Later on in smoother air a 750-fpm rate-of-climb was indicated for 1,000 feet.)

When I had the ship about 200 feet off the ground, I obeyed a printed instruction set in the instrument panel. It read: "After take-off the trim should not be changed until 200 feet of altitude is gained." Worth observing because the trim includes use of flaps for the V's take-off and the flaps furnish extra lift to increase your altitude . . . so keep your lift, keep your altitude. And because the gear folds up "fast," number two instruction on the instrument panel was that it ". . . should NOT be raised immediately upon leaving the ground." Pilots have a Confucius saying which states: "He who raises his gear most quickly upon leaving runway is most accomplished pilot." Unfortunately, it means "finished" pilot—which might be the case were the plane to settle once more on the runway before it finally became airborne.

The toggle switch on the panel to operate the gear has the BTO's familiar red spring-tab over it, familiar, that is, to pilots of military craft. This cover protects the switch in the down position. Gear warning lights of the up (red) and down (green) colors can be adjusted for brilliancy. For the pilot bringing in his craft with gear up unknowingly, there's a warning horn. NC 80144's had a pitch higher than Gabriel's to shake the pilot out of his lethargy and cause him to set down the gear or pull up off the runway as his choice may be.

Culver Aircraft Corporation stopped a little short of giving the pilot just about *everything* for simplicity in flight when they didn't hook in the electric gear actuator to the climb after take-off and land-approach positions on the Simpli-Fly tab. This would obviate the need for the pilot to manipulate a separate and special switch to raise and lower the gear. But that wouldn't be good either, for it'd leave the pilot with practically nothing to do.

And now to explain about the Simpli-Fly control. It's a glorified trim tab which moves the flaps with each trim selection, as well as

moving the horizontal stabilizer and elevator trim tab in an all-in-one movement: the conventional trim control, located between the two seats (more BTO conveniences). It is a large metal disc which is rolled back for nose-up and forward for nose-down flight. On the instrument panel is a tab that moves along a printed vertical dial informing the pilot when he has set his trim for the following: Landing; Take-off; Approach; Climb; Cruising. This writer recommends the Simpli-Fly control. It's a dandy. After using it a while the pilot would soon consider Simpli-Fly indispensable, I'm sure. It isn't infallible—that is, it isn't the cure-all for the pilots who sometimes do the wrong things. Be it ever so over-used, the statement concerning the nut at the end of the stick being the real menace to safety in flight—it is ever so true. I know about this because I was the nut at the end of the stick on Culver NC 80144 for three consecutive landings which were the more complicated for Culver having tried to make them simple. However, I'm not condemning the system, merely the way it was not observed by this pilot.

The difficulty was vested in the fact that the Simpli-Fly feature of this airplane performs best when it holds the reins. The pilot should just go along for the ride, trimming for take-off—for climb—for cruising—for approach to landing—and for landing—in short, trim for every change of attitude as he is probably accustomed to doing anyway. But take my advice, pilots, perform only the menial labor such as rolling the trim (Simpli-Fly), stomping on the brakes, selecting the prop setting, etc.—and just go along for the ride, because any time you think you can fly the Culver V better than it can fly you (landings particularly) . . . you're in for a rude awakening.

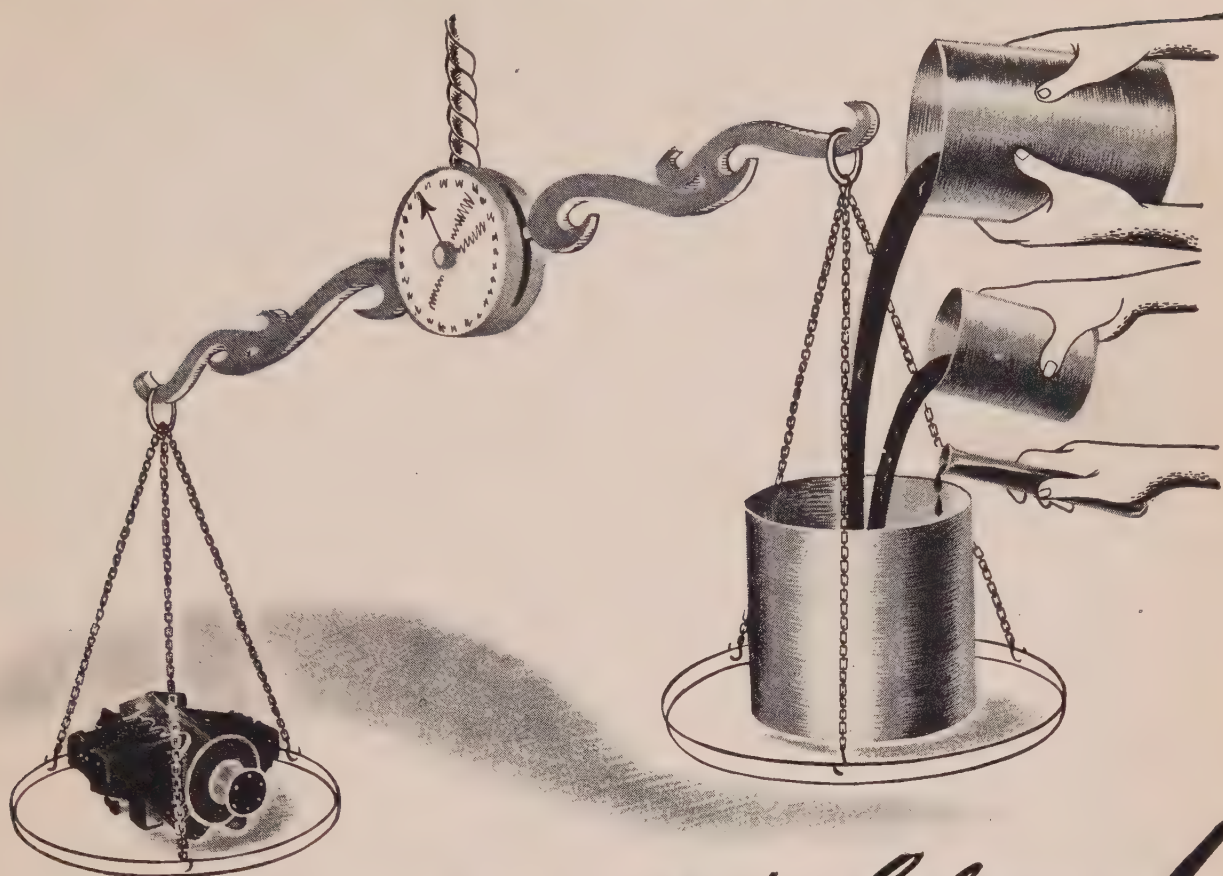
When you're in rough air, however, don't be too miffed to lend the ship a helping hand for it needs lateral stabilization which you as copilot can supply by getting on the aileron control. Below 4,000 feet the day I was up, the air produced a flight that was a facsimile of a St. Louis trolley on square wheels—and pressure was required to keep the wings level. In the rough air the Culver made its advertised true 129 mph with full power. We indicated 124 mph (corrected two per cent for each 1,000 feet meant we were making an actual 128 mph). In high pitch, cruising at 2450 rpm—the cruising rpm for the 85-hp Continental installed in the Culver—acquired an airspeed of 120 mph by the indicator, or 124 mph true. Later flying above the rough air at 6,000 feet, I applied full power again and the airspeed indicator needle moved close to 128 mph (correcting for altitude accorded an actual or true 140 mph). From an 85-hp engine too!

In stalling the Culver V, the writer found the aircraft maintained its ability to respond—and readily—to aileron movement. This together with the plane's excellent visibility virtually gives the V a clean bill of health in flight, for with this positive aileron control the pilot can obtain a wings-level attitude at will . . . which is another way of saying goodbye to unintentional spins.

Along the glide path to a landing the air speed is around 80 mph—i.e. you roll the trim until the Simpli-Fly indicator is in the "landing approach" range and your V will come in around 80 mph. The tendency of the aircraft to alight—stall on—soon after the flare out makes it necessary to flare out a

(Continued on page 74)

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engine requirements and oil characteristics—why Shell employs solvent-extraction refining and scientific blending to produce an oil that gives superior service in the performance of its many-sided task.

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FINER FUELS FOR THE AGE OF FLIGHT

SHELL AVIATION FUELS • AEROSHELL LUBRICATING OILS AND GREASES • SHELL HYDRAULIC FLUIDS

Banking By Air

(Continued from page 55)

the clearing house almost as quickly as checks drawn in Brooklyn or even New York."

The idea seemed to make sense, at least in theory, and a test was arranged. There were multiple details to be worked out, of course, but on May 1, 1946, the 30-day test period began. At the end of the experiment, not only did the Bank of America decide to make the deal permanent, but six other western banks prepared to hop on the band wagon. In addition, the Bank of America was dispatching 80 pounds of unemployment relief checks by air nightly to the state capitol at Sacramento for collection. It found air transportation worth while on a mere 500-mile haul, as well as transcontinental.

At present, the daily Bank of America shipment to New York runs around 30 pounds, each pound containing about 400 checks. The unemployment checks are heavier and average around 210 to the pound.

When you're dealing with thousands of little pieces of paper, each worth money and some of them a lot of money, they're a constant worry all the time they're out of your hands. That is where air freight appeals to the banking fraternity.

With air freight, the bank can know at all times just where the checks are, on what plane they are traveling, over what route they are being carried and just when they should arrive at their destination.

It works this way: when negotiable paper is air-mailed or sent by air express, the sender doesn't know on which of a score of planes over various routes it may be traveling. In case of accident (and this also applies to shipments by rail or other surface carriers that handle mail and express), he finds out that the shipment has been destroyed in an accident only when it fails to turn up after a relatively lengthy wait.

Should an accident occur to an air freight shipment, however, the sender will know in a matter of a few minutes that the stricken plane was the one carrying his checks. Since carefully tabulated records of the items in all shipments, air or land, are always made and retained by the bank, immediate steps

NEGOTIABLE paper sent by air is huge saving to banks since less interest is due



can be taken to replace the lost shipment.

The saving in transportation costs alone, while secondary, is an appreciable item. Were air express used instead of air mail, the saving for the 30-day period would have been \$464. But by the use of air freight, a further saving of \$250 was effected.

Before going into the ramifications that have come from the success of the tryout, let's see how this banking by air is done.

Just before midnight, the day's collection of checks from the 128 branches have arrived at the clearing offices. A horde of clerks appears and starts sorting and recording them, using what appears to be the largest single installation of I.B.M. Bank Proof machines in the United States. By 6 a.m., when the pick-up truck arrives, the eastern checks are ready. Since the other banks have joined the parade, the pick-up man makes the rounds, gathering in all the shipments, and then heads for the airport.

At 7:40 a.m., with the air freight checks stowed in a special compartment of a regularly-scheduled passenger plane, the four-engined transport starts its eastward flight. Shortly after midnight, E.S.T., it roars into New York where a delivery truck is waiting to cart the checks off to the bank's correspondent, in this case the National City Bank. At 4:30 a.m., the latter presents the shipment to the New York clearing house. Cost of the airplane ride is \$33.63 per hundred pounds.

Now that the ice has been broken, plans for the future are rapidly taking shape. As soon as materials can be obtained, a spun-glass, fire-resistant bag is planned as an added precaution for the safety of the valuable little slips of paper. In addition, American plans to install a small safe in the nose cargo compartment of the transports.

There seems every reason to believe that within a short time checks cashed an appreciable distance from the bank of deposit will be winging their way east, west, north and south as a matter of course daily. What is an "appreciable distance?" Well, Bank of America used air for as short a haul as 500 miles in case of the Sacramento shipments.

Of major significance is the tremendous field in world commerce and finance that has been opened up by the acceptance of air travel for negotiable paper. Importing and exporting already is making a fast post-war recovery. The long delay in transmission and collection of drafts always has been a headache to the exporter, who wants his money, and the importer, who wants his goods. Between Shanghai and San Francisco, for example, just picture the shot in the arm that will be furnished world trade when the draft comes through in a couple of days at the most, instead of the usual 30 days of a fast steamship voyage.

The world of finance, which, after all, must exert every effort to protect little pieces of paper worth fantastic sums, perhaps can't be blamed too much for its reluctance to accept the safety of air transport on a wholesale basis with the same alacrity that other enterprises have shown. At last, it seems, financiers are being convinced that it is no more dangerous to ship their checks, drafts and all other types of negotiable paper by air than it is to do so by rail or boat.

With the precedent set by the world's largest bank as an impetus, banking by air would seem to be on the verge of becoming a matter of course.



Culver Model V

(Continued from page 72)

close to the runway as you can judge. This more or less makes power landings feasible, i.e., carrying the plane right down to the runway with power. It lands a bit on the fast side for a novice—for 60 mph is not slow in any airman's language when it comes to touching down. For instance, at 60 mph it is not nearly so easy to pick up last minute drift from gusts—if they occur—unless you're in good flying form that day. But what the pilot may happen to lack in judgment will be made up for by the tricycle gear. For one thing, once on the runway, the plane remains down. Also—ground control of the airplane is uninhibited. The Culver V's center of gravity is forward of the main gear, throwing the craft's balance onto the nose-wheel, and the novice experiences no difficulty guiding it straight down a runway.

Back on the ground the Culver showed up one loop-hole which the writer doesn't believe is healthy. That is, leaving the cockpit. There's a very inviting way to jump off the wing and that is over the leading edge.

One hop in a Culver V explains what the "V" stands for: It's Vim, Vigor and Vitality—in short, it's full of vitamins. Its pep is harnessed by the Simpli-Fly until it's a safe, dependable airplane in flight for the pilot who abides by the Simpli-Fly operating rules. All this adds up to increased safety for the pilot. An airplane is best judged when consideration is given to the type of flying it can best perform—and similarly it is best recommended when consideration is given to the type of flyer required to obtain that performance. So let's own up to it—any ship that cruises at 120 mph and better; that is equipped with variable-pitch prop; that has retractable gear, e.g., the Culver V; requires a well-trained and alert pilot. His cockpit procedure alone consists of more than just shoving in the throttle to take off and coming back on the throttle to land. And cross-country flying at 120 mph requires navigating ability of at least par to get there. So if you're a Culver fan you're probably a good pilot, certainly a capable one.

When you write out a personal check for \$4.061, which is the V's F.A.F. price at this writing, your plane is equipped with all engine instruments, the magnetic compass and a Kollsman semi-sensitive altimeter. The cabin heater is as effective as the outside air scoop aforementioned and both "hot and cold" air are obtained by a pair of simple push-pull levers. This feature and the air-foam cushioned seats make the V a comfortable den to fly about in. By paying an additional amount your V is equipped with a Raytheon Radiophone, a Schwien turn-bank, a rate-of-climb indicator, manifold pressure gauge and such other instrumentation as you may so elect. And if you want full utility to include night flying, you should get 'em. The Culver has the range for it, 675 to 700 miles and better. Engine failure is minimized by a fuel injector (Excello) eliminating carburetor icing. There is a pair of landing lights in the leading edge of each wing and the 12-volt electrical system, plus 18-amp hour battery, is equipped with automatic circuit breaker—no fuses and no failures—making the Culver V most assuredly a ship to broaden your flight horizon beyond the evening's sunset.





Floatplane dock and ramps have grown into this pleasant country club on an inlet of one of Florida's lakes.

"Floats Built My Country Club"

Simple docking facilities, with provision for fuel and service, made this grassy shoreline an airport.



"The Orlando Aviation Country Club is built around the sport of floatplane flying, just as other clubs are built around golf. We have swimming, fishing and other water sports for pilots and have also added cabins near the beach. But floats are the main attraction. Float flying brings in a steady trade the year round and really made the club."

Wooden ramps make docking easy for these lightplanes, grouped around the Orlando Aviation Country Club.



— Letter from Thomas M. Turner, Jr., Operator of the Orlando Aviation Country Club, on Lake Killarney, Orlando, Florida

YOU CAN MAKE MONEY WITH YOUR OWN BASE Turner's base is on a lake in the heart of the Florida citrus fruit region, near a city of 36,000. His base facilities are simple. Planes dock on short wooden ramps along the grassy shore. A hangar was added, after business grew. The club is now so popular, he is adding three more Cessnas to his fleet.

There are thousands of spots in America where you can follow his example and set up a successful base of your own. Rivers, harbors, natural and artificial lakes, bays and sounds—all are available near you. Float flying is growing fast, with float plane production up 2,600 per cent over pre-war levels. You can be your own boss, if you set up a float base.

BUILD AS YOU GO It doesn't take much money to start. Begin as many operators have with one or two planes, a stretch of beach and simple docking facilities. Gain

revenue from flight instruction, charters, sight-seeing, transients, storage, sales of gas and oil, possibly water sports. Build dock, ramps and buildings in sections, then expand as volume grows.

HERE'S INFORMATION FOR YOU

You can get details on float bases—sites, construction, costs—by writing to Edo Aircraft. Free copies of "Air Harbors" and "Float Flying" and "The Flying Fish" will be sent to you at once. Just send a letter or card to the address below.

CONVERT YOUR LANDPLANE A change from wheels to Edo floats is only a matter of hours with most aircraft. Edo floats are in production for these types:

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College Point, Long Island, New York



Flying Upstairs

(Continued from page 58)

its oxygen through the process of respiration, or breathing. In inspiration, the chest cavity enlarges, the diaphragm goes down, a negative pressure is created and atmospheric air rushes in. The air is warmed and moistened as it enters the nasal passages, then it passes down the trachea (windpipe), goes into the bronchial tubes to the bronchioles, and finally into the millions of alveoli or air sacs constituting the human lung.

Each air sac, or alveolus, is surrounded by a thin membrane which in turn is surrounded by a network of capillary blood vessels through which blood flows at all times. Pressure causes the oxygen to diffuse through the thin membrane into the blood where it is taken up by hemoglobin, the red coloring matter of the blood which has a great affinity for oxygen.

The oxygen now in chemical union with hemoglobin will be transported by the blood as oxyhemoglobin to all parts of the body. At the tissues, where oxygen is being used—creating a so-called “lowered pressure”—the hemoglobin will release its supply for the use of the cells in oxidation.

As oxidation takes place, carbon dioxide is produced. This end product of combustion will diffuse from the tissues into the blood stream which carries it to the lungs where it is given off. Then, with expiration the diaphragm goes up, the chest cavity contracts, and the air, with some oxygen removed and carbon dioxide added, is expelled.

The average man will normally breathe in from nine to 12 liters, (0.3 to 0.4 cubic feet) of air per minute when sitting quietly. With exercise, cold, anxiety or excitement this amount will be greatly increased.

Occasionally, pilots have been told that deeper or forced respiration would compensate for lack of oxygen at higher altitudes. But this is unsound advice. Forced breathing, even at sea level, can be demonstrated to produce a light-headed feeling, a peculiar sensation of faintness and dizziness, then a characteristic feeling of numbness and tingling of the extremities. In extreme cases these symptoms may be followed by muscular spasms and cramps. This condition is caused by an increase in the alkalinity of the blood resulting from the excessive loss of carbon dioxide due to abnormal breathing. A person at high altitudes needs more oxygen, not just more air going in and out of his lungs. Also if the pressure is too low, he cannot get sufficient oxygen no matter how hard he breathes.

Oxygen deficiency produces a train of symptoms. At altitudes as low as 5,000 feet, the ability to see in dim light is slightly diminished. Between 5,000 and 10,000 feet the capacity to accomplish hard work is also decreased. Above 10,000 feet the ability to carry on more complicated mental processes is reduced and the will to do things gradually disappears entirely. Between 15,000 and 20,000 feet the brain becomes definitely “fogged.” Movements become less accurate. Some aviators will become pale, feel something is wrong, but at the same time be powerless to do much about it because of a sleepy feeling. Others will simply feel warm, comfortable and as oblivious of danger as the car driver with too many drinks. Above 20,000 feet an individual will gradually drop

into unconsciousness without ever realizing that anything is wrong.

Most persons will become unconscious at 20,000 feet if they remain at this altitude long enough, but many can go to 25,000 feet if they sit absolutely still and stay but a few seconds. In use of oxygen, therefore, it is not only a question of how high one is going, but also how long he is going to stay there and how active he will be.

Research work conducted in many laboratories, both in civilian institutions and in the armed forces and also in the High Altitude Laboratory of Consolidated Vultee Aircraft Corporation, has resulted in a number of recommendations in connection with the use of oxygen.

1. Oxygen should be provided in all night missions if operation above 5,000 feet is planned. It is important also in case a landing on a dimly lighted field is necessary.
2. In daytime flights below 10,000 no oxygen is required except in case of extreme activity.
3. Oxygen should be provided in flights above 10,000 feet. In all flights above 15,000 feet oxygen should be used.
4. In flights between 12,000 and 15,000 feet, oxygen should be used if the duration is longer than 30 minutes.

The ability to see well in very dim light, called “night vision,” decreases with lower oxygen pressure. This can be detected even as low as 5,000 feet. At 12,000 feet, if a flyer breathes atmospheric air without supplementary oxygen, his night vision is less than half as efficient as it is at sea level. This reduction in night vision is due to the susceptibility of certain light sensitive cells in the eyes to oxygen deficiency (anoxia). It is remedied by use of supplemental oxygen.

Normally a pilot prepares himself for night operation by staying in a dark room, or by wearing red glasses for about 30 minutes. Red light does not impair night vision, since cells in the eye most sensitive to dim light are not affected at all by light of this color. Night vision can be maintained by turning off all unnecessary lights and making others as dim as possible.

Sometimes test flyers are forced to bail out at high altitudes where oxygen is being used. If one is compelled to jump at altitudes

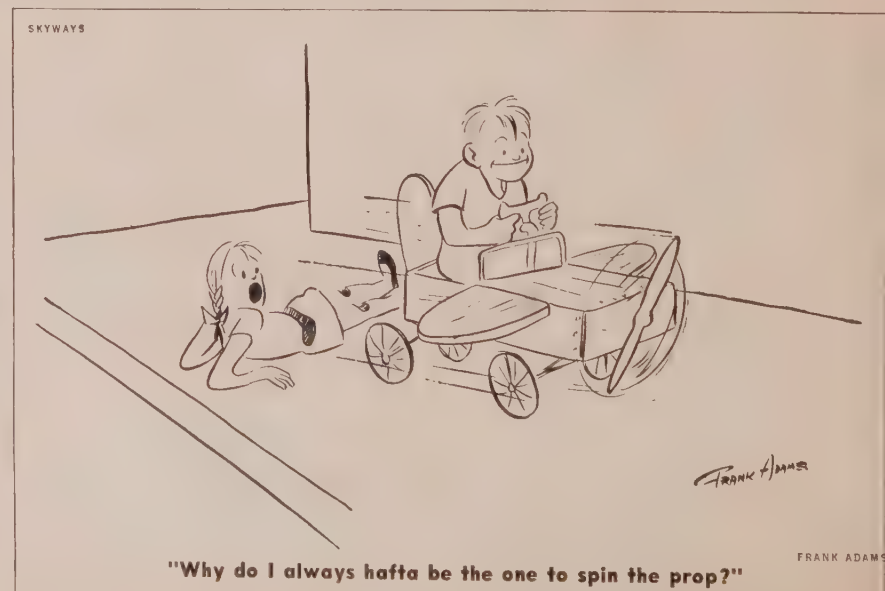
above 25,000 feet without oxygen, he might lose consciousness before pulling the ripcord. He can prolong the period of consciousness by holding his breath. Normally one can hold his breath from one to two minutes, but by taking half a dozen deep breaths it is possible to hold one's breath from one-half to two times longer. Overbreathing has an effect of washing out carbon dioxide, which stimulates the respiratory center, from the lungs and blood. This will not produce serious symptoms as described previously if done for only 10 to 20 seconds. After heavy breathing, it will take a longer time for the carbon dioxide to accumulate enough to force the individual to breathe. A flyer must therefore take several deep breaths of oxygen with his mask still on before he jumps at high altitudes without oxygen. The safest method in jumping from high altitudes is to be equipped with a portable oxygen bottle. Military services provide this for emergency jumps.

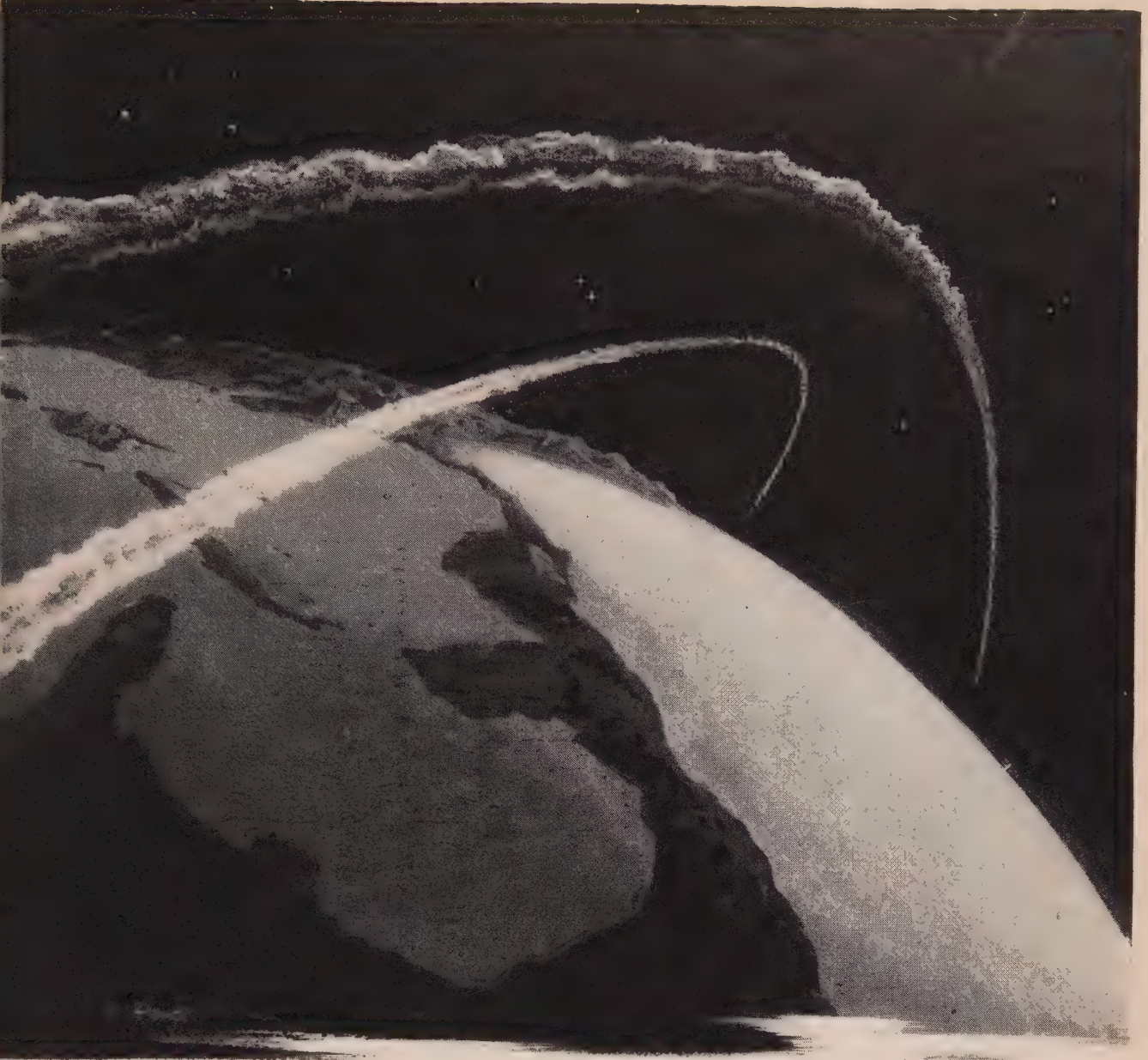
Decompression sickness is a term used in medicine to describe disability arising from bubble formation in the tissues and blood induced by reduction of pressure surrounding the body. It is rarely noticeable below 30,000 feet in aviation. The terms “aeroembolism,” “aeroemphysema” and “bends” describe the same symptoms. The word “bends” is also used in describing decompression sickness occurring to divers.

Bubbles will develop in the tissues and blood with ascent because with decrease of atmospheric pressure, gases normally present in the body will tend to come out of solution, somewhat as carbon dioxide comes out of soda water when the cap is removed.

Symptoms of decompression sickness will appear when minute bubbles join or coalesce into larger ones and obstruct blood vessels, thereby depriving certain tissue areas of blood supply. Characteristic symptoms are tingling, itching, cold and warm sensation in the skin. Deep muscular aches or pains referred to joints are often experienced. Burning pains in the chest, probably caused in part by blocking of the circulation in the lungs are sometimes felt. Bubbles caught in the central nervous system may cause anesthesia (inability to feel pain), paralysis, blurring of vision and other nervous disorders.

(Continued on page 78)






Research takes the long range view

Today's achievement in the air was yesterday's research problem. Now, when men can fly in comfort miles above the earth, science is reaching up 100 miles and more to explore the possibility of controlled flight through interstellar space. Curtiss-Wright engineers have played a major part in the development of ram-jet missiles and continuing studies in flutter research will be verified by supersonic wind tunnel tests on small dynamic models.

The Curtiss-Wright record in design and manufacture of aircraft provides a fitting background for the beyond-the-horizon planning which guides our thinking for tomorrow.

FIRST IN FLIGHT
CURTISS  WRIGHT
Airplane Division
COLUMBUS, OHIO

Developing Flight to
Meet the Future.

Flying Upstairs

(Continued from page 76)

orders. These may be relieved by descent to a lower altitude—a zone of higher pressure.

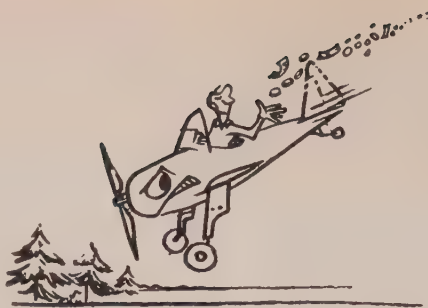
Aeroembolism can be prevented, or its effects greatly minimized, by breathing pure oxygen prior to rapid ascent, or continuously during slower ascents. If 100 per cent oxygen is inhaled, the nitrogen is removed from the lungs. This permits the gradual elimination of nitrogen from the body as fast as the blood can pick it up from the tissues and carry it to the lungs. In this way, about one-third of the total nitrogen in the human body can be eliminated in approximately 45 minutes by inhaling pure oxygen on the ground.

The question is often asked if oxygen is injurious if taken in excess. The answer is not in the field of aviation. Pure oxygen has been inhaled for 12 hours at a time by aviators without any harmful effects. Oxygen becomes poisonous only when it is breathed at a pressure higher than atmospheric, as divers and sand hogs do. Pure oxygen would be harmful to them.

Oxygen manufactured by liquafaction from the air is stored in large cylinders under pressure in gaseous condition. In military planes, the oxygen supply is carried in small metal cylinders and is connected to oxygen regulators by tubing. These regulators are connected to the masks worn by the crew members and deliver oxygen in proper amounts and pressures as they inhale. Oxygen used in aviation is at least 99.7 per cent pure and must be dry so that no water will get into the system of tubing to freeze in the extreme cold of high altitudes. The new jet fighters have pressurized cabins and have frequently operated above 55,000 feet. The *Constellation* also has pressure cabins, but carries portable oxygen containers as well. This will be true of the other big airliners of the future.

A person cannot go above 40,000 feet by breathing pure oxygen because the pressure is so low that it just will not go into solution in his blood. Although there may be plenty of oxygen in his lungs, the low pressure prevents it from being delivered to his brain and other tissues in sufficient quantities to keep them functioning. The question is often asked if women require more oxygen at high altitudes than men. For all practical purposes in aviation the requirements are the same. And how about older pilots? Increasing age does not influence a man's oxygen requirements appreciably. If an older man knows how to use oxygen, he can fly as high as a younger man, other things being equal. Recent figures show that, other things being equal, women have the same reaction to oxygen deficiency that men do.

In aviation today, many men are flying who, in view of the popular conception that flying is a young man's field, should not be in the air at all. Many of these older men are the most valuable flyers we have. They have demonstrated conclusively that flying for the industry, unlike pursuit flying, is definitely not just a young man's game. Older pilots who "know" they do not need oxygen because it is considered "effeminate" are now hard to find. Most of them use it prudently and can and do fly as high as younger men. Thus, their greater experience, which is particularly valuable in all types of flying, is not lost.



Altitude is money . . . don't throw it away!

Dilbert

(Continued from page 46)

UNSAFE FOR SOLO—The other day a pilot experienced complete engine failure at 4,000 feet directly over his home field. Although he had been flying solo for over a year, he muffed his approach so badly that he landed in the rough 100 yards short of the runway. Although the pilot was easily repaired, the plane definitely wasn't.

This Dilbert had either neglected to maintain the precision landing technique learned during training or he was not familiar with the glide characteristics of this particular airplane. His feeble exhibition of judgment and skill is a good reminder that every airplane has its own special glide characteristics; that they even vary in the same plane for different loading conditions; that the stronger the wind, the shorter the gliding distance will be and that gliding distance always is less with a dead stick.

All these fundamentals were involved in this fiasco. Dilbert even forgot the rule: Always keep a little extra altitude; you can easily lose it, but never regain it.

Only through practice can you "keep your hand in" on precision landings. That's why smart pilots make occasional cut-gun landings from various altitudes and positions. Also, when checking out in a new plane, these pilots always include a power-off landing. Of course, they always remember to blimp their engines during long glides.

MISAPPLIES CAUTION—A half hour after take-off, Dilbert brightly noted that he had lost approximately 250 rpm. Since he hadn't moved the throttle, he figured it must be mag trouble and immediately landed in a nearby hayfield to check. The landing was without incident and everything checked perfectly on the ground.

His take-off wasn't so good, however. There were some trees at the end of the field and when he attempted to pull over them, he stalled and spun into an adjoining graveyard.

No, Dilbert didn't bury himself! He wasn't even injured, but let's hope he interred the remains of any ideas he may have had about being a "hot" pilot. I'm going to ignore this bum take-off. I'm not going to belabor the pilot for attempting it under the conditions which existed. . . . What burns me up is that the basic cause of this washout was the pilot's lack of knowledge of his equipment. After 650 hours flying time this aviator didn't even know that he could check mags in the air. Of course, you couldn't expect such a dimwit to check his carburetor heat control.

Did I say this accident was caused by lack of knowledge? I must be slipping! Change that to gross and culpable ignorance.

Puddlejumpers

(Continued from page 39)

through that procedure. Isn't it a lot more fun to walk around the little puddlejumper, shake it a couple of times to be sure that nothing is about to fall off, fire up, check the mags, and be on your way? Of course, a few other incidentals including fuel and oil supplies should be checked, but it isn't a long, complicated job as in a big plane.

And your little airplane doesn't have "George." George is the gadget that makes all big airplane pilots gin-rummy addicts. He is the automatic pilot that you turn on once you've leveled off at cruising altitude. Some pilots even let him guide the climb away from the field. Aside from routine trimming adjustments, George does all the work until you drop down for a landing. How much can a pilot actually learn about flying by listening half-heartedly to a radio range and letting George do all the work? True, by the time you're first pilot on a transport, you know nearly all there is to know about straight and level flying and George is a swell companion. But how many 10,000-hour pilots have actually flown more than half that?

The average puddle jumper is still without radio and the pilot can call his soul his own. There isn't always a control tower or airways operator yapping at you. So you can't land at all the big fields without that radio. But you have to park halfway down a 6,000-foot runway from the restaurant. Seldom can you get hangar space. And when you finally get ready for take off, how far do you have to taxi to the take-off runway? You guess.

There is a companionship in flying puddlejumper never found in bigger planes. You can take the Missus, if you've got one, and go wherever she darn pleases. Of course your companion will scream bloody murder when she finds that there isn't room in the baggage compartment for a hat box, but she probably looks better in a little beanie anyhow. And besides, it gives you an excuse to wear some of those old, comfortable clothes.

You may not get to Aunt Suzie's at the exact hour you telegraphed ahead, as you might in an airliner, (yes, that "might" makes a realist of me) but you've had a lot more fun along the way. How much of these United States can you actually see from the aisle seat of an airliner at 10,000 feet? If your puddlejumper doesn't climb too well (many don't), you can get a much closer look at the country.

And if the weather gets stinko, set'er down. Who wants to fly in bad weather anyhow?

That little plane is just good fun to fly. No flight plan to worry about, no radio to make your head buzz for hours, and no computer or flight performance charts to monkey with. You just point the propeller in the general direction of your destination and check the map every few minutes.

This isn't meant to snipe at the big plane pilots. They're a good bunch of Joes and they know a lot of flying—they'd have to or they wouldn't be where they are. But to you pilots who are just getting started in this flying game, enjoy what you've got now. The further you progress, the more you'll look back on the trips and vacations in little, low-powered airplanes and say "those were the good old days."

If it's got over 150 horsepower, you fly it. I'm happy in the little jobs.

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Music in the Air

(Continued from page 30)

He's been at it for seven years, was a civilian pilot before the war, then enlisted in the air corps. He's been trying to teach me how to fly for heaven knows how long—with, I confess, little success. But, as he points out in reference to the concert tour, "we'll always be sitting on silk, honey, so no worry."

Right now we're using an AT-6 which we bought as war surplus for some \$2,500. However, we have had a Johnson *Rocket* on order for some time and we'll switch to the smaller plane as soon as it comes through.

Dean has figured that it costs us approximately \$12 to \$14 an hour in traveling expenses for the plane alone, including parking fees. Naturally, this doesn't include the initial investment or insurance, or what Dean calls "over-all." On the face of it, it seems a pretty expensive project. But actually, we will just about break even with any other method of transportation.

We couldn't possibly have used an automobile because the hops between concerts are so great. To begin with, the tour runs through mid-May and covers Canada and 18 states from Washington to New York, Wisconsin to Texas. The same problem exists with buses, and trains, of course, are notoriously tiring—particularly in my profession where the voice depends so much on physical fitness. Then again, one can never be certain of connections by train, especially in the sections of the country which we will hit. The only other medium—boat—would never get us where we're going, for obvious reasons.

There was the possibility of booking passage through a commercial airline, but here again, no commercial line goes into all the cities and towns where we are scheduled.

Hence, buying the plane turned out to be one of our most sensible impulses in years. And for many reasons: time, convenience, sight-seeing, fun. Weather complications have proved a little difficult, but no more so, I presume, than they would have with a commercial line. And we always have sufficient time before a concert to make other transportation arrangements if necessary.

Dean has seen most of the country before but I have not. As a result, we've got scores of side trips on our agenda—including a long-delayed one to Niagara Falls. Dean even takes along his photographic equipment and has been shooting like mad at practically every stick and stone we bump across.

As Dean witticizes: "Extra time means extra energy extra everything." Using the plane, we can schedule twice as many concerts, and still have room for the Metropolitan as well as the sport and entertainment activities already mentioned. So we carry tennis shorts and swimming suits along with evening gowns and tuxedos.

It's been a wonderful experience these past months. I mean working together again as a couple, which hasn't been possible since before the war. I first met Dean in a San Francisco nightclub. "The boss hired her," is his description, "and I had to use her." He was a band-leader then and a very fine pianist. These days, he not only flies the plane but is back at the piano—as my accompanist.

The tour has been grand. Though we've been the first to try it, I'm sure we won't be the last. After all, who can resist the lure of combining pleasure with profit?

Sky Speedway

(Continued from page 29)

(1,640 feet) approach to the course. Two planes carrying barographs and qualified observers watchfully circle over the course to make certain the speed plane remains below altitude minimums at all times. And to make things even tougher, the speed pilot must exceed the previous mark by 5 mph to establish a recognized record.

Split-second timing is done with high-speed cameras capable of 500 frames per second. A wire is suspended over the bench marker on each end of the speedway and the cameras are lined up at right angles to the course. The frame of 16-mm film showing the nose of the plane nearest the wire is checked against the reading of the synchronized watches photographed in one corner of the speed picture. Over 1,600 feet of film is required for development and analysis in a Hollywood laboratory. NAA officials Larry Therkelsen and H. Dudley Wright supervise the timing. In subsequent tests, photoelectric timers may be used for greater precision.

To aid the pilot, a 12-foot wide black oil strip has been painted the entire length of the three-kilometer course. Pink smoke pits are lighted at both ends of the course before each of the four passes in front of the cameras, two upwind and two downwind.

Recent attempts to bring the International speed record to the United States were made at Muroc with a Republic XP-84 *Thunderjet* piloted by Captain Martin L. Smith of Kid-

der, Missouri. At this writing, the current official record of 616 mph established by a British Gloster *Meteor*, has been broken unofficially by the XP-84 with a time of 619 mph for one pass through the markers. It takes an average of four passes to make it official, plus an excess of five miles over the existing record. Hence 621 mph (or exactly 1,000 kilometers) is the new goal. (Unofficially this speed has been exceeded, as two laps of the *Star Meteor* Record Flight showed 1002 and 1001.6 kpm.) West Coast Aviation writers were invited by the Army to witness these tests. The procedure undoubtedly will be similar if and when the world's record is officially broken.

The speed tests were conducted shortly after dawn when the air was breathlessly still. Even the lightest air "bumps" are greatly magnified at 10-mile-a-minute speeds, and Captain Smith reported over 7 G's on his accelerometer from turbulence encountered close to the ground.

From take-off to landing, the XP-84 flew nearly 300 miles to make four passes at the speed course. Turns at each end of the course took 25 to 35 miles to complete. The *Thunderjet* was easy to spot in the air because of the plume of black smoke rushing from the General Electric TG-180 axial-flow jet engine. Factory representatives say that this will be eliminated in subsequent models.

For watching newsmen, the speed dash was spectacular, yet unassuming. Here was a new plane, the second of its type to roll from the assembly lines less than six weeks before, flown only eight hours total time,

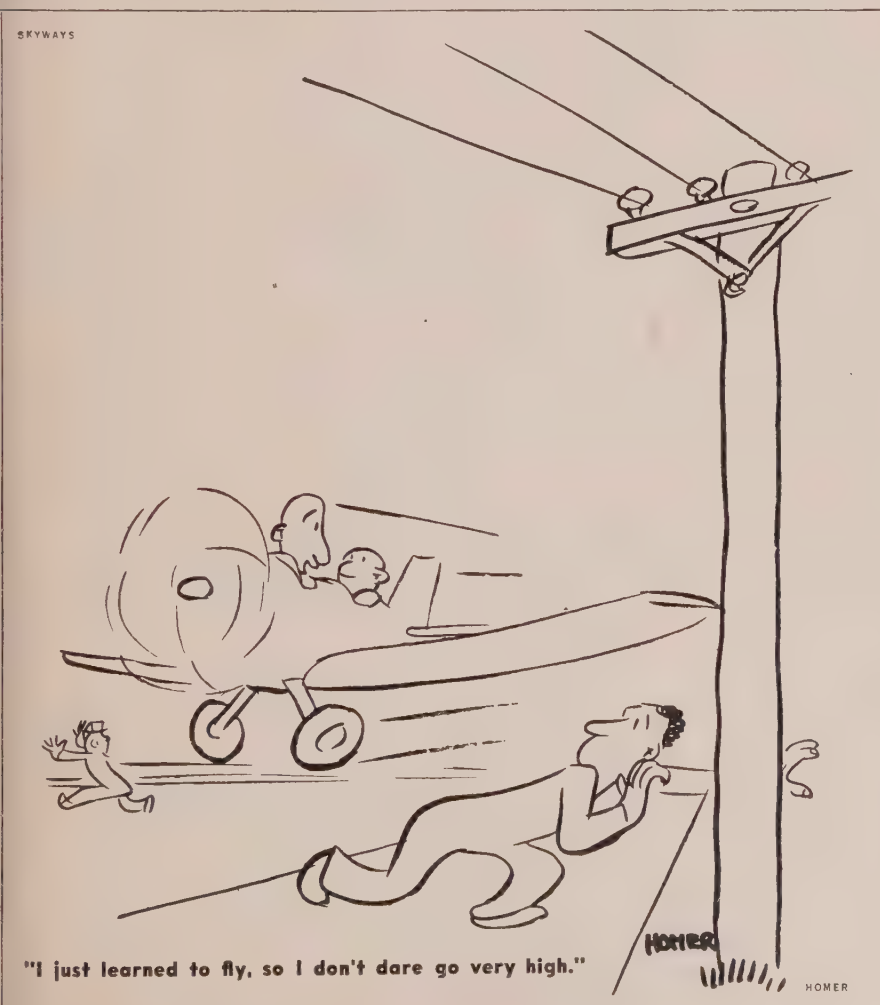
and already in quest of a world's record. The XP-84 used in these tests was a stock model, not specially souped up for a trial at the record. True, armor and guns were eliminated, but in their place was more than an equal weight of test equipment.

As the *Thunderjet* streaked through the sky on four passes before the cameras, observers on the ground watched quietly. There isn't much to say about a plane speeding through the air faster than any plane has flown before on a straightaway course. It just takes your breath away, adjectives and all.

This test didn't officially break the world's record. The next one may not either. Nor is it always possible to run such complicated affairs as world's speed record attempts exactly on schedule, as England, as well as America, has found out. Weather is one of the big factors. For example, an attempt was to have been made by the Army Air Forces at Muroc Dry Lake during early October, using both the Republic XP-84 *Thunderjet* and a special version of the Lockheed P-80 *Shooting Star*. Prematurely cold weather was the primary cause of the postponement. Instead of the hoped for 85- or 90-degree temperature, the thermometer was around 60°. When the atmosphere is hot the speed of sound, hence the Mach number and "critical speed" of a particular airplane, is higher. The exact critical Mach number of the P-80 and the XP-84 have never been revealed, but it is believed that it is not much above low-level Mach .80. (Britain's Gloster *Star Meteor*, present holder of the official international speed record, has been announced as Mach .83). At 50° (F) low level Mach .82 is 621 mph, or 1,000 kph, the present figure necessary to make a new record. Officials ruled that it was not regarded as safe to make the attempt, as any crowding of the critical speed is apt to result in shock-wave turbulence which will either tear the airplane apart or throw it hopelessly out of control. This is what is believed to have happened to Geoffrey de Havilland when his D. H. 108 tailless jet fighter exploded in the air during a test flight in September.

The other reason for postponement of the attempt had to do especially with the *Thunderjet*. This was the failure of a booster system of alcohol and water injection for the J-35-GE axial-flow turbojet to live up to performance recorded in bench tests. In these tests at General Electric, the 4,000-pound normal thrust of the J-35 was boosted to better than 5,000 pounds, but in the air these results were not forthcoming, a failure in cooling the turbine causing the blades to score its metal container. A similar system for the J-33-GE (originally I-40) turbojet in the P-80, which has a centrifugal compressor, works all right in flight, and it is expected that a few months' work at the most will take care of the difficulty in the axial-flow unit of the XP-84.

Special features of the souped-up P-80 include the boosted turbojet, smaller bubble canopy, buried air scoops, clipped wings and highly polished metal finish, with paint removed. The AAF are out to make another attempt for the official record next spring, and there is no question but that eventually either the P-80, or the XP-84, or the North American XP-86, will officially hit the 1,000 kilometer per hour figure (621 mph) and better. We can only keep our fingers crossed that the British jet planes will not have exceeded this speed by that time.



"I just learned to fly, so I don't dare go very high."

A hop - skip -

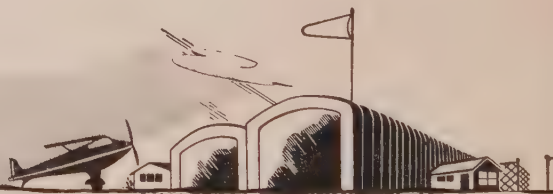
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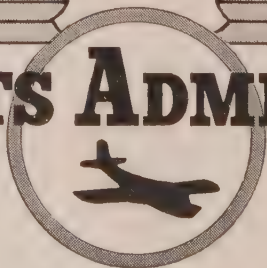
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Operations Main Street

(Continued from page 37)

tions to have even graver concern over his mental capabilities. For he wanted to build his seadrome and landing strip right on top of the city dump! But being a far-sighted man, he saw the advantages of the spot: it was on the shore of Lake Michigan; it was a short, two-block walking distance from downtown Milwaukee; and it boasted of enough property (50 acres of it) to permit expansion when, and if, business prospered.

The City of Milwaukee, however, didn't jump at the chance to lease its city dump to Tony Lange. The city fathers apparently weren't air-minded and were cold to what they considered a "crackpot" proposition. Although they wanted to get the city dump off their own hands, they set the price so high that it was out of reach for everyone, including Mr. Lange. For three years, from 1934 to 1937, this state of affairs existed with Mr. Lange never once giving up his determined fight to persuade the government to lower its price and lease him the property.

Finally, in March, 1937, the city weakened. The owners were convinced at last that they would never be able to lease the land at the price they had set; yet they still weren't so pleased with Mr. Lange's offer that they were willing to let him have it out-right, at his price, without first angling for a better proposition. So they announced their willingness to lease to the highest bidder. Mr. Lange's bid went in, for the same amount he'd offered back in 1934. His was not only the highest bid, it was the only bid and he regrets, he says, that he didn't offer about 50 cents, just to see if the city would have accepted it!

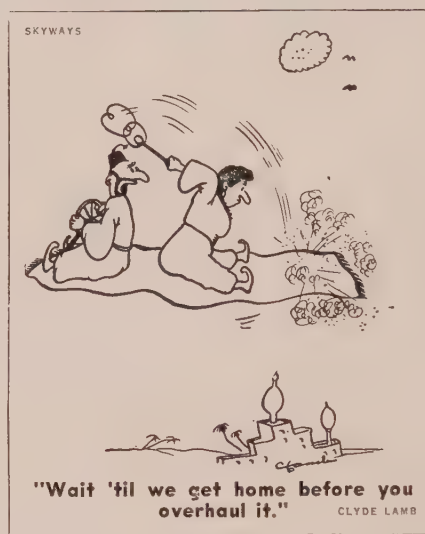
At last the Lange Aviation Corporation could get underway on the shores of Lake Michigan. Anyone interested in starting an aviation enterprise such as this can learn a lot from the way Tony Lange set up shop. His creed, which is apparent the moment you set foot on his field, is: Don't put all your eggs in one basket. He does not believe in specializing in the sale of only one commodity, nor in offering only one type of training, or one type of aviation service. He doesn't just sell and service planes; he does the same for all types of boats, from canoes to cruisers. His base isn't only for use by seaplanes; he has turned the city dump into very excellent runways for the benefit of landplanes. The only specialty that can be said to exist at Maitland is that both the seaplane base and the landing strip are for the exclusive use of private flyers. It is strictly their airport, one where they can be sure of no interference in their activities by larger commercial craft. When planes are again available in large quantity, the Lange Corporation will not confine its sales to only one type of plane: it will offer both seaplane and landplanes, and these will be of all types to appeal to a wider market.

As an added bit of ingenuity, the Corporation has added a small manufacturing business to its long list of diversified activities . . . and some of the products turned out in the small machine shop, located a half mile from the base, are a far cry from either the marine or aviation business. As an example of this are the deep freeze units, the aluminum sand boxes and aluminum cheese boxes going out from the shop by the hundreds. The

aluminum boxes, along with a steel boat lift, are not only manufactured there, but were designed by the men of Maitland.

But this is getting ahead of the story, for it all didn't come at once. It has been a gradual growth, to which the war lent an impetus and brought the field's highly divergent activities into being.

The Lange Corporation started operations with only the seaplane base in active service, and with only two planes—a Piper Cub and a Fairchild, both equipped with floats. There were no runways back in 1937, but the 50 acres had been levelled off and firmly packed. With this combination of facilities, the base rapidly became a popular stopping-off place for pilots, mostly from Canada and Michigan, who wanted their planes changed



over from wheels to floats, or vice versa. In addition to this service, the field offered pilot instruction plus charter and sightseeing flights. Gradually business began to pick up, and then, toward the end of 1939, Maitland became one of the first fields in the country to enter the WTS program. Later, in 1940, the Lange Corporation was the first in the country to give war training service on floats, and was also the first and only Wisconsin operator to give Link instrument training for the Army. It was during the war that the Corporation first went into the manufacturing business with the award of a contract from Wright Field for pontoons, a contract which was continued as late as the summer of 1946. Other Army contracts received at Maitland called for landing gear bolts for B-29's, hydraulic systems and aircraft propeller hubs.

All this new business called for new facilities. Hangars and a machine shop were built, and finally, in October, 1945, work was begun on the runways, to make the base just as inviting to landplanes as it had been to seaplanes. The center runway, 100 feet wide and 2,500 feet long, runs parallel to the shoreline which some might consider a disadvantage since it means that landings and take-offs must be made in a cross-wind. However, this disadvantage is offset by the advantage that an along-the-shore take-off reduces the noise element—a factor to consider when the field is so close to the city. So far, there has been no official complaint about noise registered against the Maitland Air Strip. The runway is covered with cinders which is not the most popular type of runway materials because cinders are hard on

props. But in this case the use of cinders has proved extremely effective: they hold the heat, which blows in from the city two blocks away, and melt the snow, which, in Milwaukee winters, is another factor to be reckoned with. Since the completion of the air strip, Maitland Field has been the only airport in the Milwaukee area which has remained open during the winter months.

"During the last Christmas shopping days," says Mr. Lange, "it was surprising the number of women who flew into the field, parked their planes here and walked to the shopping section; then came back with ribboned bundles and took off for their home towns."

There is no question that the added business which the war brought to Maitland was like a shot in the arm to a young organization trying to get a sound financial start in life. It's true that during the war the field was abnormally active; yet, little of that activity has subsided since then, thanks to the Corporation's far-sighted business policy of resisting the temptation to specialize only in aviation, or only in one type of aviation service. Had the Corporation relied upon the sale of planes, for instance, as its principal source of revenue, its three members would probably be adding red numbers to the ledger instead of black ones, and still be waiting for planes to be produced in sufficient quantities to provide them with a lively business. Instead, however, they have had the sale of boats to ease them through what otherwise might have been a lean reconversion period. And every boat customer is regarded as a potential plane customer, just as every person interested in buying a plane or learning to fly is considered a possible boat purchaser. This way, each branch of the business serves the other.

The two planes which are at Maitland now—a Fairchild and a Luscombe—are giving constant service in sightseeing trips, charter flights, and pilot instruction. The sightseeing trips are perhaps the field's most popular attraction, for at least 100 passengers a day pay \$2.50 to be carried out over Lake Michigan and around Milwaukee. There are two dozen students at the field learning to fly: and in the Luscombe they pay \$13 an hour for dual instruction and \$10 for solo. In the Fairchild it's \$20 an hour throughout the entire course. Hangar rentals are \$1.50 a night for single-engine lightplanes and \$2.50 for biplanes. The two T-hangars and one larger hangar which, in itself, can accommodate nine combination landplanes and seaplanes, give the field a hangar capacity of from 12 to 14 planes. All about the place there's an atmosphere of great activity with a determined and high purpose. For instance, in the 30-day period from July 15 to August 15, 1946, 3,000 landings and take-offs were made at Maitland, including both water and land operations. And Mr. Lange estimates that an average of three out-of-town pilots use the facilities every day. There is one instructor at the field, and Mr. Lange flies the ships on all charter flights.

This type of field is making a real contribution to the future growth of aviation. It is a healthy business, stemming from an effective combination of varying and worthwhile enterprises, plus the determination to make it work. And from this the country too, will grow and benefit if other men in other cities on or near the water, will follow the pattern which the Lange Corporation of Milwaukee's Maitland Field has set.

Washington News

(Continued from page 2)

which can be used for plotting air routes. Confidential during the war, they were made for the AAF, but Coast and Geodetic says they are valuable for personal flying. Produced on the Lambert Conformal Conic Projection, with stereographic projection of polar areas, they can be joined to make an approximate globe. Coast and Geodetic is now checking its charts in the U.S. to discover airports not as yet charted on any available maps. In the Washington area alone, they recently discovered 20 fields not charted, some with hard-surfaced runways. These undoubtedly will be incorporated in the new charts at an early date.

World Network

The world wide airline network is now over 300,000 miles in length, according to Sir William P. Hildred, Director General of the International Air Transport Association. This international air route system has grown 50 per cent during the past year and is more than double the prewar mileage. The 35 national carriers provide air service to better than 200 countries. Keenest competition at the moment is to determine who will win the race to institute the first round-the-world service. A number of European companies have already reestablished their old routes and have added new ones, and many new companies have entered the field. Eight nations are now competing on the blue ribbon North Atlantic route and a considerable number have begun or are planning on operations over the South Atlantic. Lack of equipment is not preventing the newcomers from making their bids for a place in the sun. The heavy postwar increase in passengers, freight and mail are being met as well as possible by getting the utmost out of each plane available. Even old tri-motored transports, 10-year-old flying boats and converted bombers are being used.

Lightplane Production

Upping of lightplane production was particularly notable in the last report of the Aircraft Industries Association. Twelve personal aircraft manufacturers shipped more personal planes in Sept., 1946, than in the entire year of 1939. This was a slight drop from the August total, reflecting the seasonal decline that comes with bad weather and the continuance of some labor and material problems. However, many of the producers have now reached their planned production levels. The total for completed aircraft for the month was 3,902, and there were on hand 33,830 unfilled orders, with a total value of \$78,096,000. Helicopters and gliders were not included in the tally. Symptomatic of good results in international air relations as a result of lowering of U.S. air mail rates for all foreign service, is the announcement that Argentina has cut its mail rate to the U.S. and Canada to 35 Argentine cents a half ounce—slightly less than nine cents American. New U.S. rate to Argentina is 10 cents.

P.S.

South American students, trained here during the war, are now coming back to the States to buy U.S. planes.—Alice R. Hager

JANUARY 1947

Air Picnic

(Continued from page 25)

the borderline between the U.S. and Mexico. Though the American side of Nogales is divided from the Mexican only by a thin wire fence, coming into the Mexican Nogales is entering another country and another century. The tempo is slow motion. No one hurries. What for? Why not do everything that must be done tomorrow, mañana?

We stopped to haggle in the shops spilling forth a profusion of color in handblocked prints, woven baskets, silver, garish embroidery. Then the party trickled to have their pictures taken by an itinerant Mexican photographer who developed the prints right in front of you, in a bucket. Then someone suggested having a drink at La Caverna, a restaurant built in a natural cavern, once a hangout of desperadoes, later the city jail. The idea developed into a production: a Mexican band came out on the sidewalk to serenade us to the wistful strains of *Guadalupe*, and to the strains of Mexican harps, piccolos, and mandolins the owner treated us courteously on the house.

After this we made another run on the shops coming out with an assortment that would have baffled a professional psychologist. There were ashtrays too small to hold ashes; earrings too big for the ears; serapes, bright enough to cause eyestrain; huge Mexican hats one could use for pup tents. The customs officials looked at us with bored amusement and let us through.

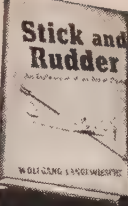
Everyone would have liked to have stayed longer, but on the horizon angry anvil tops were gathering. The rumble of thunder was heard in the distance. Experienced Arizonans predicted dust-devils to hamper taxiing, cross-winds to make the take-off tricky and the imposing thunderhead itself to make probable a circuitous route homeward—or at least a race across its path. So newly purchased wares and tired shoppers beneath the deluge were somehow fitted into cockpits with ample room left to see out.

By the time we took off for the airstrip on the Kinsley ranch, the flying cattleman's domain in the Santa Cruz valley, to do some fishing and boating, it was already raining. Menacing clouds were moving in. But at Kinsley's, as often is the case on the desert, it was clear. The small lake, an overflow of his irrigation pump, was so well stocked with fish, Briggs and Sparky caught one before the canoe was three feet from shore. But before anyone else could have much of any fishing, the clouds were upon us again. This time they were blueblack, with lightning zigzags. There was no time to be lost.

A curtain of dust on the horizon told us that it was high time to vamoose. We did, in haste, with Briggs' and Sparky's catch carefully packed along beneath a sombrero or two. But even at that, Hudgin's *Ercoupe* barely escaped accident. Caught in a crosswind, it dipped a wing over a ditch and cut a topknot from a cottonwood.

As the oldtimers had predicted, the trip was choppy and rough, but storms were skirted and everyone arrived safely, laden with good food, souvenirs, and memories of a pleasant time. On the way back, plans for a new picnic were started. The next one will start from Kinsley's, who keeps a plane around just 'coz he ain't got no time for them automobile-bikes. But that's another story.





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Check That Compass

(Continued from page 43)

compass, i. e., North, South, East and West, are designated by the letters N for North (0 degrees), E for East (90 degrees), S for South (180 degrees), and W for West (270 degrees). At every 30 degrees the numeral, minus the tenth and hundredth figure, appears, i. e., 120 degrees is designated "12," 30 degrees by "3," etc.

A thing to remember is that the Magnetic North to which the magnetic compass refers is not the North Pole as we see it atop the globe in a classroom. The position referred to as True North is the geographic position of the North Pole. But because the pilot's maps are all made with reference to the North Pole, or True North, the angular difference between Magnetic North and True North must be accounted for. In aerial navigation, this angular difference is known as magnetic variation, and is classified as easterly or westerly, depending upon the relative positions of Mag North, True North and the plane. If you're flying on the west coast, for example, the variation would be 19 degrees easterly; if flying somewhere around Rochester, N. Y., the variation would be 9 degrees westerly.

These degrees of variations are clearly indicated on your S.A.C.'s, however, so don't worry about them or wonder how you're going to find out what they are. Do remember, though, that an easterly variation is subtracted from your True course heading to give you a Magnetic course or compass heading to follow, while a westerly variation is added to your True heading to give you the Magnetic or compass course to fly. An easy way of keeping this in mind is to memorize that old saying: "East is least and West is best."

There are other distracting forces, however, which the pilot cannot make up for mathematically, and those are the forces we're primarily interested in. These disturb-

ances of the man-made variety are termed "deviations." The electrical equipment in a plane, the engine, the metal seat clasps, metal trim, etc., all are capable of setting up deviations in the magnetic compass and, therefore, must be corrected or compensated for by the plane manufacturer when the ship comes off the assembly line, or by the plane owner or mechanic. Whether this deviation compensation is done by the manufacturer when the plane is new or by the plane owner who's checking a 10-year-old plane, the method is the same. . . .

Assuming you are a plane-owner-pilot who wants to check his magnetic compass . . . and it's a wise plane owner who periodically does . . . here's how it's done:

With a compass rose:

(A compass rose on an airport is usually a concrete circle with no steel reinforcements, graduated in degrees from 0 to 360, as a reference to directions, True and Magnetic. The four cardinal points are marked, N. S. E. and W.)

Place the center of the plane's fuselage over a line marked by a cord stretched between N and S, with the plane headed N. Or if there's a bar, the plane's wheels are rolled up to it and the compensation's more accurate.

Elevate the tail until the plane is in true flying position. The tail can be placed on a wooden dolly.

With the plane headed North, set all controls in a neutral position. Remember to remove all equipment that is not part of the permanent furnishings.

Sit in the pilot's seat and with your head in line with the mag compass' lubber line, note the magnetic indication of the cord.

In this case let's assume that your compass reads 335. Then, using a brass or any non-magnetic screwdriver, move the N-S screw until "0" shows up behind the lubber line. When that's been done, turn the plane to Magnetic E (90). If the compass doesn't show E directly behind the lubber line, move

the E-W set screw until it actually does.

Now turn the plane so that its nose is aligned with the S (180) heading, and then the W (270) heading. Unlike the full correction made on the N and E headings, on the S and W only half corrections are made. If the S heading reads 182 degrees, turn the N-S set screw until it reads 181. Do the same on the W heading.

With this done, the compass, is ready to be finally swung for each cardinal heading and for the 45-degree heading. On a work sheet, etc., such as the one shown below, fill in the deviations that are noted.

Master	Plane		Master	Plane	
Com-	Com-	Error	Com-	Com-	Error
pass	pass		pass	pass	
North	2°	+2°	South	182°	+2°
45°	45°		225°	227°	+20°
East	94°	+4°	West	270°	
135°	137°	+2°	315°	311°	-4°

From this work sheet, a compass card for the cockpit is made out. It is known as the compensating card and contains the cardinal and intercardinal headings and the correct heading which the pilot should steer when flying by the magnetic compass in the particular plane. It would look like this:

For	Steer	For	Steer
North	258°	South	178°
45°	45°	225°	223°
East	86°	West	270°
135°	133°	315°	319°

If your airport does not have a compass rose, a similar plan for compass checking may be followed by using a master compass. If such is the case, follow this procedure:

Standing at the rear of the plane, sight Magnetic North on the master compass. Then have someone move the plane until it is lined up with Magnetic North. Remember to have someone in your plane and the engine turning over at cruising rpm during entire procedure—with the brakes on and chocks in front of wheels.

Noting, perhaps, that the compass reads 2 degrees instead of 0, move the N-S screw with a non-magnetic screw driver until 0 or N appears behind the compass lubber line.

By the same method, i. e., sighting from the rear of the plane with the master compass, turn the plane to magnetic (90) and make the adjustment.

Similarly, and compensating for half the deviation as you would using the ground compass rose, make the compensations for S (180) and W (270).

Then repeat the whole procedure, filling out your worksheet as previously explained and from it make the compensation card that will be fastened to the instrument panel.

In swinging or boxing a compass, there are a few precautions to keep in mind. Most important, the area in which the compass swinging is done should be free of metal, i. e., hangars, wire fences, etc. . . . anything that would deflect a mag. compass.

If your plane is equipped with any electrical equipment—landing lights, navigational lights, instrument lights, radio transmitter and/or receiver, turn these on and note what differences, if any, they make in the compass reading. (If you used a compass rose, start the engine, too.) Such equipment as this, if properly shielded and bonded, should make no difference at

(Continued on page 90)



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COVER—This three-place lightplane, designed and built by Bendix Aviation Corporation, might be referred to as "little plane that wasn't there." Actually, after building the prototype, test flying it, and even advertising the ship indirectly, the Bendix Corporation decided against entering the personal-plane field. The plane was withdrawn from production and announced for sale—lock, stock and design barrel. The design of the plane is good; its test flights indicated its performance to be of top quality. For those reasons and because of the interest in the plane on the part of aircraft manufacturers, *Skyways* is presenting it on its cover.

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PROP WASH

Aero Oddities

Cow Catcher. William Leach, Dunkirk, N. Y., farmer, dashed out of his house to have a look at a buzzing plane. Plane pilot Dedrick, Fredonia airport operator, cut the engine, leaned out of cockpit and shouted: "Hey, yer cows are out." Farmer Leach hurriedly began rounding up 50 rambling cows.

Three Strikes. Princeton student Rhuhl got lost and landed his plane on snow-covered field near Morristown, N. J. So doing, he cracked his prop. Dante Pinelli flew in with replacement, cracked his propeller on landing. Few minutes later, Jane Shaw, Wilmington, Del., spotted two planes, landed hers to see what was up. You guessed it . . . cracked her propeller, too.

Corn Husker. L. D. Stancill, sheriff of Baldwin County, Georgia, hunts moonshine stills from the air. Pilot-Sheriff Stancill has many hits, few misses.

S.O.S. Harold Teubert, Janesville, Wisconsin, farmer, is looking for a flyer . . . the one who made a forced landing in his field last October and still hasn't returned to get the plane. Says Farmer Teubert, "It'll soon be time to start getting crops in the ground. The plane is in the way."

Small Change. Two diaper services in New York state have inaugurated air transport of babies' pants 'tween plants.

One Run. Art Bell flew over his Seattle, Washington home, spotted his young son playing in the street, cut the plane's engine, yelled down, "Hey, Art, get out of the street!" He did.

Att'n Readers:

PROP WASH is your column. If you have any news-note oddities pertaining to aviation, send them to *SKYWAYS*, Box 17, 444 Madison Avenue, New York 22, N. Y. Five dollars will be paid the sender of each "oddity" printed on *Prop Wash* page. In cases of duplication, the *Prop Wash* contribution first received at the office of the editor will be honored. Contributions cannot be returned unless accompanied by stamped addressed envelope. The decision of the editors is final.

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Check That Compass

(Continued from page 38)

in the compass readings. If they do, however, you'd best get hold of an electrician and put him on the job doing the necessary shielding, etc., before you go ahead with your compass checking or compensating.

Farmers or others who are familiar with the countryside can check their compass while in the air by using fences and roads for references—if they are laid out in a true north and south, and east and west direction. One method Kollsman instrument pilots sometimes use is to fly toward a north-south road holding the wings parallel to the road. If you do this, just remember that the compass would indicate, not E (90°) or W (270°), but plus or minus the variation in your vicinity. Your compass reading should amount to the steering course on the compensating card. And checking the compass between the N-E-S-W cardinal headings also can be accomplished in the air—if the pilot is over farmland where the sections are lined up on true cardinal bearings. The roads and crops between fences set up squares and rectangles across the area below. By cutting across the fields and flying from the corner of one field through the corner of the next, keeping the corners in a direct line of sight ahead of the plane, the pilot can fly the 45-degree bearings between the cardinal points in no wind condition, or quartering head or tail wind.

Here again it is necessary to add or subtract for the variation in that part of the country. After this is done, a heading other than 45°, 135°, 225° or 315° should coincide with the compensating card.

A made-to-order check is the airport having runways with compass headings painted at each end. Flying at an altitude over traffic pattern height, the pilot can line his plane up to fly toward the runway. If the compass on his panel shows the same bearing the numerals on the runway indicate, the compass is correct—this is because no allowance for variation is necessary inasmuch as the runways are marked in Magnetic bearings. If any difference shows up, it is deviation and should be accounted for on the compensating card.

Air swinging or checking of a compass requires smooth air, else the compass bobs like a cork on a rough sea. The pilot can check his magnetic compass headings only when the following flight limitations are observed: 1) Plane must not be gaining or losing altitude, else deceleration and acceleration errors prevail; 2) Cruising throttle must be observed as a greater or lesser rpm might affect the mag compass reading; 3) Keys in pockets, goggles on instrument deck, metal paraphernalia in cockpit can attract the magnets in the compass; 4) Mike and earphones and other accessory equipment must be in place; 5) Extremely low flying along a railroad track will cause the mag compass to read incorrectly. So if you're air swinging your compass, be sure to check those five points.

For safety's sake, before you take that cross-country hop inquire about the compass—especially if you're renting your ship. And if it's your own, guard it well—and yourself—by keeping a good check on that compass. Don't be a Mister Lost Pilot because of careless compass care.



Night Flying

(Continued from page 19)

have your plane's wheels in a position to touch the ground.

Cross-winds and the drifts they occasion are boldly apparent in night landings—the lights beside the runway, as you drift toward or away from them, are clearly defined by the dark outline of your plane and the angle it forms with the lights. The air at night is smooth, free from the gusts and the thermals sunheated runways and adjoining plowed fields produce. Therefore the pilot's glide path and flare-out for landing are unaffected by anything save his own application of judgment.

I discovered the hard way that piloting takes just as much looking around at night as it does in the daytime—perhaps more for it is difficult to judge the speed with which you approach other objects or the speed at which they come upon you. My lesson took place down Texas way. We had been briefed before sundown for a two-hour night flight. Mine was to Odessa, Texas, along the Abilene-Big Springs-Midland-Odessa light line. As soon as our eyes were accustomed to the dark we went out to the planes and gave them a careful preflight inspection. This inspection, by the way, is a "must," and it included all control surfaces, fuel and oil caps for security, tires (for inflation—any other going-over of a more scrutinizing nature should be done in a well-lighted hangar or before sundown), pitot-tube cover, prop for firmness and/or nicks in the blade, and the engine cowl to see that it is secured. After this was completed I checked the cockpit to see that all loose straps, baggage, extra cushions, etc., were secure and in place. This particular night my airplane also called for a check of the landing strut oleos for equal inflation, wings for rigidity and tail section for firmness—for other pilots had flown this ship before me and in night flight, since there is no alternative in case of plane failure but to bail out, every precaution must be performed before take-off.

You think this is unnecessary? If you're anxious to be an old pilot, you'll consider it top priority.

The take-off, as I remember it now, was uneventful but probably not at the time for night take-offs always carry a certain measure of suspense. For one thing, the pilot learns to keep his eyes in his cockpit or on known horizon lights in front of him . . . looking rearward has confused many a pilot on



take-off by mistaking stars for electric lights. Upon assuming flight altitude I checked gas, prop setting, mixture, gear and flaps. Everything was going to go off smoothly as far as this first nighter was concerned.

Following the light line with its blinking code was a new and slightly challenging experience, and Midland and Odessa were in sight all too soon. Over Odessa I climbed a thousand feet and made a "one-eighty" back to the home field.

But my altitude was a faulty 4,875 feet although I had just reported 5,000 feet over my radio to airways control. Well, the flight was going to be perfect. The quickest way—though not the safest as I soon discovered—to regain lost altitude is to "horse" back on the stick. The sensation is akin to zooming up a steep grade on a roller coaster and dropping off the other side. Only when you zoom up the track of a White City Special you don't come up under the belly of a B-17 like this one did. Scared? It took all the strength I could muster in both hands to ease that stick forward and nose the plane down and away from the horrendously proportioned silhouette of a '17 from the underside. The bomber had a course that had brought it from the left and rear. Its crew likely never saw me but I know how close we all came to eternity. That's a lesson I'll never forget.

Navigation is easy at night even without the iron beam you are accustomed to following in the light of day. You chart your course on your map and check it well by taking note of the pattern the towns form along your route. This may not seem easy at first, but with a little practice it comes easy.

And speaking of charts, here's a tip—some charts are treated so that they show up well at night under fluorescent, red or amber cockpit lights. That's good! Because under cockpit lights ordinary airways charts somehow seem to lose their all-important lines. Another self-help a pilot can render himself is in the use of treated pencils for marking his charts so that those lines also show up under cockpit lights. Keep these in mind and in the cockpit for a night flight.

The lighted towns and villages are one reason night navigating is fairly simple. You can see towns from greater distances than in the daytime, and they make up a pattern for you. At one point on a night cross-country hop, San Angelo, Texas, was visible 20 miles astern; Coleman 35 miles far to the right and, unmistakably, Lawn was underneath my wing while two light lines 20 and 25 miles away converged at right angles of my left . . . the same as it was on the map. My position was thus stereotyped by the lighted panorama below. It was as though my winged flight were but a facsimile made by a plastic model of a plane being moved across a map over which I was leaning in a dimly lighted room.

Many things about the terrain which you are accustomed to during daytime flight are not visible at night. Obstructions, except prominent outlines of ridges and mountain against the horizon, are not visible, nor are railroad tracks. The general plan of the terrain is absorbed by a dim single contour of the land—moonlit night's excepted.

If you're used to highways on your list of check points for daytime contact flight these need not be given up as check points for night flight. Traversed highways are out

(Continued on page 92)



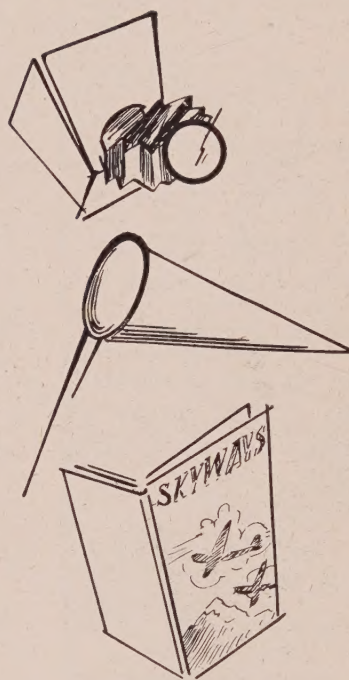
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Appearing for the first time in the next issue of SKYWAYS (February), this new section—"THE FLYING SPORTSMAN" will bring you exciting stories, articles and pictures of sports people, planes and places.

Actually a magazine within a magazine, "THE FLYING SPORTSMAN" will cover the sports field for flying hunters, fishermen, and holiday flyers.

Look for "THE FLYING SPORTSMAN" in the February SKYWAYS—on sale January 10.



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SKYWAYS including THE FLYING SPORTSMAN

44 Madison Avenue

New York 22, N. Y.

JANUARY 1947

Night Flying

(Continued from page 90)



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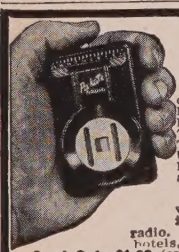
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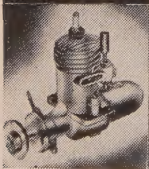
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lined by the headlights of automobiles, snake dancing across the countryside. Rivers, if large enough, will show up, too.

One of the wisest, most practical and least tiring methods of night navigation is to follow the airways light lines. Don't be ashamed of the lack of perplexities on this type course. Take advantage of an airmarking system lighted for you. The lights (or beacons) are at 15-mile intervals along the airways. Some beacons have green and amber instead of red and amber lights. Such lights denote the exact or nearby location of facilities with night-landing accommodations.

The light line consists of rotating lamps which send out code signals. They flash six times each minute and are visible on courses up and down the airways. Pilots locate the exact position of their flight by these code signals, since aeronautical charts also bear the position of each airline beacon. You need to know two things—one is what the code is blinking in dots and dashes. This you can match to the dots and dashes marked on your chart. The other is a general idea of your location, i.e. between which cities, on what airway, etc. Here is how it works: the code signal will be one of a sequence to 10. The signals are always in the same order on all U. S. Airways. They are the code for W-U-V-H-R-K-D-B-G-M. Frequently this is memorized by pilots with the aid of the following sentence: "When Undertaking Very Hard Routes Keep Directions By Good Methods." Sort of the airman's version of the typist's: "Now is the time for all good men to come to the aid of their party."

There are several ways of making use of lighted airways. If your course cuts across country off airways but eventually takes you across a light line, you can check your position soon as you cross the lights. Do this by spotting a beacon either to your left or to your right. Read the signal it flashes . . . if you come upon dash dot dot dot, or B, on your left then your location is across the light line to the right of the B denoted on your map.

The next time you fly airline at night, look out the window and watch for a light line. You'll see the red beacon flashing code signals. This is the light line your pilot is following. Time it from one light to the next, and you can discover for yourself the number of miles per hour your plane is traveling over the ground. If the beacons are 5 minutes apart, your speed is about 180 mph.

Maintenance of altitude is doubly important at night. Observe even thousand-foot altitudes while on courses of south and west headings; and uneven thousand-foot altitudes while on north and south course headings. On all aeronautical charts "critical altitudes" along airways are indicated and these minimums should be checked in planning the flight—and followed without fail.

Night flights above 10,000 feet should be avoided because the pilot's vision from 6,000 feet on up is unsuitable due to lack of oxygen—this, no matter how many raw carrots you eat the night before.

Forced landings at night generally consist unalterably of bailing out, that is why the best precaution against them is a properly executed flight preparation that will preclude possible engine failures. However, pilots in

aircraft equipped with flares can exact measure of assistance from their u. Dropped onto the field into which the plane will land, they will create a fair amount of light—illuminating trees, barns, etc. They are effective for 3 minutes.

A well-planned night flight includes weather check—and double check. Flying into clouds or over them at night, since you cannot see the gray of stratus layers, is unavoidable if they are present. At best it can be for a 180-degree turn O-U-T—unless you know what you're about, i.e. have a panel of lighted instruments, two-way radio that will get you a CAA approval to file an instrument flight plan which in turn can be for an instrument flying certificate.

If you do find yourself in the clouds, the most immediate concern, strangely enough, is to follow your compass heading until you have adjusted your eyes to your cockpit. Determine your reciprocal heading, i.e. 180°'s opposite on your magnetic compass and make your turn. Not before.

If you are fortunate you will one time fly within full view of a cloud formation with electrical activity. The cloud will be lighted by turquoise blazes one second and then fade into pink and finally darkness again. It's pretty to look upon—but only look upon. Chances are your radio will be more static than useful transmissions—don't rely solely on radio for navigation.

Many of today's personal planes are equipped with wing landing lights. One thing to remember in connection with these lights is that they are not built to stay on for lengthy periods. Often times the wing landing lights, after being on for a few seconds, either burn out or fuse to their casings and then cannot be turned off again.

To guard against this, you should have landing light lamps on for only short periods of time. In practice this means light should only be used in short "flashes" during taxiing. On the landing glide, specifically onto lighted runways, the landing lights need not be used until within 200 or so of the ground. This is especially true of those lights which do not have particularly high wattage to produce longer range.

However, if you think you might be around other planes whose pilots do not know you exist—turn on every light you got—the devil with a burned out lamp. Better it than a washed out plane and pilot.

On the ground, remember that your landing lights blind the pilot into whose cockpit they may project. So be careful.

Flashing on and off your navigation lights, wing, lights is recommended whenever an aircraft is observed in flight. By doing so the other plane's pilot will be attracted to your presence. Airline navigation lights flash automatically—in time your personal plane will have this accessory too.

Constant radio contact—if you have radio—and strict attention should be maintained in and around airports at night. Reverie comes after the flight.

A flashlight, checked prior to take-off to make certain it's operable, is a must. If a plane's electrical system should, by chance, become inoperative, a flashlight can light the panel, your map, and once you're on the ground let other planes know you're there.

So it is with night flying—a thrilling experience that causes the pilot to resolve to do it again. But it will be well to remember—day or night—calls for clear thinking.

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FOR OUR OWN SECURITY

By Gill Robb Wilson

STOCKHOLM . . . Most writing and thinking on future national security is concentrated on the supposition of revolutionary weapons. Atom bombs, rockets, submarine-battleships, and supersonic speed aircraft have the call.

In one respect this is wise since it prevents development with the military establishment of a Maginot Line type of contented ignorance. In another respect it may tend to create the impression that national security can be assured at a level removed from the active participation of the people themselves. This is a dangerous presumption. Whatever military reorganization is forthcoming from the battle among the brass, will be ineffective unless it starts with the premise that total war calls for total public participation in defense.

Many were amazed by the tenacity of German resistance under the anvil blows of aerial bombardment. That resistance was not entirely due to Fascist enthusiasm but to previous training. The German public was organized to play a competent part in its own survival. The same was true of the people of England. The most amazing sights I saw in the last war were the burghers of London meeting their problems with organized effort.

Whether the lesson of civilian participation in modern defense has been taken to heart by the military establishment of the United States is probably a moot question. At the outbreak of the late war, there was an abysmal ignorance on the subject except in a few marked instances. Being then active in the Civil Air Patrol, I vividly recall the frequent sneers which greeted the whole idea. On one occasion I heard a wax-moustached Colonel in the Air Forces remark to another, "Why don't these damn civilians mind their own business? They'll funk it the first time they see a submarine."

The Wasps, Waves, Wacs, Hospital Aids, volunteer drivers and the entire kit and boodle of organization which was necessary to carry out the job of total war had to run the same gamut of scepticism, and only vision in the top command gave each and all a chance to prove themselves. Repetition of that kind of thinking would cost the United States more than it could pay in a future crisis.

In agreement with many, I regard universal military training as essential to a sound security establishment. Unless the armed forces have a chance to indoctrinate more than the few of the regular service with the techniques of modern

scientific weapons, we can have no security worth mentioning. But above and beyond that is the equally basic requirement for thousands of young women to handle the military paper work, the warning services, the communications systems, the airport towers, the first aid requirements, etc.

Why should not every policeman and fireman in the United States have comprehensive training in military intelligence, in evacuation procedures, in emergency duties connected with possible enemy action? Why should not the mechanics of every airport be kept abreast of the maintenance problems of the latest types of aircraft and engines? Why should not the thousands of devoted women who serve as Hospital Aids have reserve recognition and opportunity to train at intervals under regular nurses?

It appears to the writer that were a policy of this kind to be enunciated and millions of Americans to be made participants in their own guardianship, the effect might be toward increased unity and patriotism. The Navy constantly used the phrase: "your Navy"; but I never hear the words without thinking that it takes more than mere words to bridge the gap between the military and the civilian. Talking about it but doing nothing about it merely emphasized the chasm. Before the Navy can be "our" Navy and the Army "our" Army and the Air Forces "our" Air Forces, we the people must more realistically be made a part of the show.

When our country was young the very nature of our forefathers' work made them a part of the nation. Their individual struggles were tied up with the development of the land, its institutions, and laws. Today that is not true to the same extent. We live in a great complexity of industry and business and both think and speak of our government as something remote. It is "they" in Washington, and "we" as citizens. For our history, we have a deep affection. For our country as an ideal, we will fight and die. Our flag in the breeze brings mistiness to our eyes. But for our government as it exists, we have little emotion. This is not right. Steps must be taken to make us more a part of our nation as it lives day by day. Otherwise we shall slip further and further away from that which has made us strong—unity of heart and mind. This great objective the military establishment can foster by bringing the public to the work of intelligent and hearty cooperation for their own security.

